UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

JUN 2 9 2006

4WD-FFB

Ms. Mary Kicklighter
Deputy, Environmental Management Division
78 CEG/CEV
455 Byron Street, Suite 465
Robins Air Force Base, Georgia 31098-1860

SUBJ: **Final Second Five-Year Review for the National Priorities List (NPL) Site Operable Units (OUs) 1 and 3**
Robins Air Force Base
GA1 570 024 330

Dear Ms.Kicklighter:

The U.S. Environmental Protection Agency, Region 4, (EPA) has reviewed the above referenced document. EPA concurs with the findings and recommendations of the document and the enclosed "Protectiveness Statements" for OU-1 and OU-3.

Please contact Dr. Dann Spariosu at (404) 562-8552 or spariosu.dann@epa.gov should you have any questions regarding this matter.

Sincerely,

for
Beverly H. Banister
Acting Division Director

cc: Brent Rabon, GADNR

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DEPARTMENT OF THE AIR FORCE
78th Air Base Wing (AFMC)
Robins Air Force Base Georgia

1 6 JUN 2006

78 CEG/CEV
455 Byron Street, Suite 465
Robins AFB, GA 31098-1860

Mr. Dann Spariosu
US EPA, Region IV
Sam Nunn Atlanta Federal Center
10th Floor, Federal Facilities Branch
61 Forsyth Street, SW
Atlanta, GA 30303

SUBJECT: Transmittal of Final Second Five-Year Review Report for the National Priorities List (NPL) Site, Operable Units (OUs) 1 and 3, Robins Air Force Base, Georgia

The attached report is submitted in accordance with terms of the Final Record of Decision (ROD) for the NPL Site, Operable Units (OUs) 1 and 3, dated September 2004.

Our points of contact are Mr. Philip Manning, (478) 926-1197 ext. 127 or Mr. Fred Otto, (478) 926-1197 ext. 146.

Mary Kicklighter

MARY KICKLIGHTER
Acting Chief, Environmental Management Division

Attachment:
Final Second Five-Year Review Report (2 copies)

FINAL
SECOND FIVE-YEAR REVIEW REPORT
FOR THE NATIONAL PRIORITIES LIST (NPL) SITE
OPERABLE UNITS (OUs) 1 AND 3
ROBINS AIR FORCE BASE, GEORGIA

78 CEG/CEV
Robins Air Force Base, Georgia

June 2006

Lead Agency Acceptance
Second Five-Year Review Report
National Priorities List (NPL) Site
Operable Units (OUs) 1 and 3
Robins Air Force Base, Georgia

This signature sheet documents the United States Air Force acceptance of the Second Five-Year Review Report for the National Priorities List (NPL) Site, Operable Units (OUs) 1 and 3 at Robins Air Force Base, Georgia.

Theresa C. Carter
THERESA C. CARTER
Colonel, USAF
Commander, 78th Air Base Wing

19 JUN 06
Date

FINAL
SECOND FIVE-YEAR REVIEW REPORT
FOR THE NATIONAL PRIORITIES LIST (NPL) SITE
OPERABLE UNITS (OUs) 1 AND 3
ROBINS AIR FORCE BASE, GEORGIA

FOR

78 CEG/CEV
ROBINS AIR FORCE BASE, GEORGIA

CONTRACT NO. FA4890-04-D-0008,
DELIVERY ORDER NO. Q601, TASK 9

Prepared for:
Environmental Management Division
Robins Air Force Base, Georgia

Prepared by:
GeoSyntec Consultants

June 2006

Cuneyt Gokmen, P.E.
Delivery Order Manager

Tamara Hebeler, P.E.
Project Engineer

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EXECUTIVE SUMMARY

The purpose of this second five-year review is to determine whether the remedy at the National Priorities List (NPL) site, Operable Units (OUs) 1 and 3, at Robins Air Force Base (AFB), is protective of human health and the environment in accordance with the Final Record of Decision (ROD) dated September 2004.

The NPL site, which has been listed under the Comprehensive Environmental Response, Compensation, and Liabilities Act (CERCLA) since 1987, originally consisted of three OUs: (i) OU1 was defined as source areas associated with Landfill Number (No.) 4 (LF04) and the sludge lagoon located within the northern portion of LF04 (often referred to as Waste Pit 14 (WP14)); (ii) OU2 was defined as the wetlands and surface water impacted by the OU1 source areas; and (iii) OU3 was defined as the groundwater impacted by the OU1 sources areas. In August 2003, it was determined that OU2 was not associated with contaminants from the OU1 source areas; and therefore, OU2 is no longer a part of the NPL site and is being addressed separately under the Resource Conservation and Recovery Act (RCRA) regulations delegated to the state of Georgia. For this reason, OU2 is not discussed in this second five-year review.

The assessment of the technical performance of the OU1 and OU3 remedies, which is primarily based on the results from 2005 sampling events, indicates that both systems are effectively meeting Remedial Action Objectives (RAOs) and are protective of human health and the environment. It should also be noted that the remedial system at the NPL Site has operated almost a full year since the 2005 sampling events, and therefore, the remediation progress has continued to move forward beyond the progress discussed herein. Both remedial systems have been in place long enough that they are mechanically and physically stable and reliable. No changes in the operations and maintenance (O&M) program for OU1 are required to preserve the current level of performance and protectiveness. The OU3 remedy will continue to be adjusted for optimal performance, which may, with regulatory approval, include a transition to monitored natural attenuation (MNA) in the near future.

The remedy at OU1 is protective of human health and the environment. Potential exposure pathways that could result in an unacceptable risk are being controlled by the landfill cover system and through implementation of institutional/land use controls (LUCs).

The remedy for OU3 is protective of human health and the environment. Potential exposure pathways that could result in an unacceptable risk are being controlled through implementation of LUCs. Contaminant concentrations in groundwater near the source area have reached a point of asymptotic decline at or near the maximum contaminant levels (MCLs). Furthermore, LUCs prohibit drinking or potable water supply wells at the NPL site.

Overall the remedial actions at the NPL site are protective of human health and the environment.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name ***(from WasteLAN)***: NPL Site, Operable Units 1 and 3, Robins AFB		
EPA ID ***(from WasteLAN)***: GA1570024330		
Region: 4	**State:** GA	**City/County:** Warner Robins, Houston County
SITE STATUS		
NPL status: ☒ Final ☐ Deleted ☐ Other (specify)		
Remediation status (choose all that apply): ☐ Under Construction ☒ Operating ☐ Complete		
Multiple OUs?* ☒ YES ☐ NO	**Construction completion date:** September 1998	
Has site been put into reuse? ☐ YES ☒ NO		
REVIEW STATUS		
Lead agency: ☐ EPA ☐ State ☐ Tribe ☒ Other Federal Agency		
Author name: Philip Manning		
Author title: Project Manager	**Author affiliation:** Robins AFB, 78 CEG/CEVP	
Review period: November 2005 to June 2006		
Date(s) of site inspection: March 9, 2006		
Type of review: ☒ Statutory ☐ Post-SARA☐ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ☐ 1 (first) ☒ 2 (second) ☐ 3 (third) ☐ Other (specify)		
Triggering action: ☐ Actual RA Onsite Construction at OU #1 ☐ Actual RA Start at OU#____ ☐ Construction Completion ☒ Previous Five-Year Review Report ☐ Other (specify)		
Triggering action date ***(from WasteLAN)***: July 1, 2001		
Due date ***(five years after triggering action date)***: July 1, 2006		

Issues:

The excellent performance of the OU1 remedy requires only the continuation of routine inspections and O&M. No technical issues affecting the performance of the OU1 remedy were identified.

Similarly, the OU3 remedy has been very effective in achieving the RAOs identified in the Final ROD and has performed as designed. No technical issues affecting the performance of the OU3 remedy were identified. In fact, the OU3 remedy has passed the point of diminishing return due to significantly decreasing contaminant concentrations in groundwater. As a result, as stated in the Final ROD, the OU3 will be eventually be transitioned to MNA. This will not affect the protectiveness of the remedy.

Recommendations and Follow-up Actions:

Because of the exceptional performance of the remedies implemented at the NPL site and the adherence to Final ROD requirements, no issues were identified during this second five-year review process requiring follow-up actions.

Protectiveness Statements:

Protectiveness Statement for OU1

The remedy at OU1 is protective of human health and the environment. Potential exposure pathways that could result in an unacceptable risk are being controlled by the landfill cover system and through implementation of LUCs.

Protectiveness Statement for OU3

The remedy at OU3 is protective of human health and the environment. Potential exposure pathways that could result in an unacceptable risk are being controlled through implementation of LUCs. Contaminant concentrations in groundwater near the source area have reached a point of asymptotic decline at or near the MCLs. Furthermore, LUCs prohibit drinking or potable water supply wells at the NPL site.

Comprehensive Protectiveness Statement

Overall, the remedial actions at the NPL site are protective of human health and the environment.

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LIST OF ACRONYMS

78CEG/CEV	Environmental Management Division of the 78th Civil Engineering Group
AFMC	Air Force Materiel Command
ARARs	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CH_4	Methane
CFR	Code of Federal Regulations
cis-DCE	Cis-1,2-dichloroethene
CO_2	Carbon Dioxide
COCs	Contaminants of Concern
DNR	Department of Natural Resources
DO	Delivery Order
ft	feet
FFA	Federal Facilities Agreement
FR	Federal Register
FS	Feasibility Study
GA EPD	Georgia Environmental Protection Division
gpd	gallons per day
gpm	gallons per minute
GWTP	Groundwater Treatment Plant
GWTS	Groundwater Treatment System
IMs	Interim Measures

LIST OF ACRONYMS (Continued)

IWTP	Industrial Waste Treatment Plant
lbs	pounds
LF04	Landfill No. 4
LUCs	Institutional/Land Use Controls
MCL	Maximum Contaminant Level
Mgal	Million Gallons
mg/kg	milligrams/kilogram
MNA	Monitored Natural Attenuation
MSL	Mean Sea Level
MSW	Municipal Solid Waste
NCP	National Contingency Plan
No.	Number
NPL	National Priorities List
O&M	Operation & Maintenance
OT	Other Site
OU	Operable Unit
PCE	Tetrachloroethene or Perchloroethene
PDM	Programmed Depot Maintenance
PRGs	Preliminary Remediation Goals
RAB	Restoration Advisory Board
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RI	Remedial Investigation

LIST OF ACRONYMS (Continued)

RL	Remedial Level
Robins AFB	Robins Air Force Base
RPO	Remedial Process Optimization
RW	Recovery Well
SDWA	Safe Drinking Water Act
sq ft	square feet
SWMU	Solid Waste Management Unit
TCE	Trichloroethene, Trichloroethylene
µg/L	micrograms per liter
US EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WP14	Waste Pit 14
WR-ALC	Warner Robins Air Logistics Center

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1.0 INTRODUCTION

The purpose of five-year reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of the reviews are documented in Five-Year Review Reports. In addition, Five-Year Review Reports identify issues found during the review, if any, and identify recommendations to address them.

Robins Air Force Base (AFB) has conducted this second five-year review of the remedial actions implemented at the National Priorities List (NPL) site, Operable Units (OUs) 1 and 3 (National Superfund Identification Number: GA1570024330). This report documents the findings of the review.

The NPL site, which has been listed under the Comprehensive Environmental Response, Compensation, and Liabilities Act (CERCLA) since 1987, originally consisted of three OUs: (i) OU1 was defined as source areas associated with Landfill Number (No.) 4 (LF04) and the sludge lagoon located within the northern portion of LF04 (often referred to as Waste Pit 14 (WP14)); (ii) OU2 was defined as the wetlands and surface water impacted by the OU1 source areas; and (iii) OU3 was defined as the groundwater impacted by the OU1 sources areas. In August 2003, it was determined that OU2 was not associated with contaminants from the OU1 source areas; and therefore, OU2 is no longer a part of the NPL site and is being addressed separately under the Resource Conservation and Recovery Act (RCRA) regulations delegated to the state of Georgia. For this reason, OU2 is not further discussed herein. Throughout the remainder of this report, the Robins AFB NPL site consisting of OU1 and OU3 may be intermittently referred to as LF04.

This Second Five-Year Review Report was prepared pursuant to CERCLA §121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA §121 states:

"If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such review."

In addition, 40 Code of Federal Regulations (CFR) §300.430(f)(4)(ii) states:

"If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action."

This second five-year review process included participation by several groups. Each participant group is identified in Table 1-1 along with its role in the review process.

The First Five-Year Review Report was approved in July 2001 (Robins AFB, 2001). This document is the Second Five-Year Review Report of the remedial actions described by the Final Record of Decision (ROD) for OU1 and OU3 (Earth Tech, 2004). This review was conducted from November 2005 to June 2006.

TABLE

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Table No. 1-1
Participants and Associated Roles and Tasks

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Participant	Role	Tasks
Robins AFB	Lead agency and project manager for preparation of the Second Five-Year Review Report	• Review scheduling • Prepare Second Five-Year Review Report • Community involvement coordination • Lead site inspection
United States Environmental Protection Agency (US EPA, Region 4)	Primary support agency, responsible for review of the Second Five-Year Review Report	• Review Second Five-Year Review Report • Participate in site inspection
Georgia Environmental Protection Division (GA EPD)	Invited participant as support agency	• Courtesy review of Second Five-Year Review Report • Participate in site inspection
Restoration Advisory Board (RAB)*	Invited participant	• Participate in public discussion of review document
GeoSyntec Consultants (GeoSyntec)	Technical support	• Assist Robins AFB in preparation of Second Five-Year Review Report including assessing protectiveness and performance of remedies and preparation of community information items • Participate in site inspection

*RAB will be transitioned to an Environmental Advisory Board (EAB). This is anticipated to occur at the June 2006 RAB meeting.

2.0 SITE CHRONOLOGY

Table 2-1 provides a chronology of events, by category, for the NPL site, OU1 and OU3. In addition to the events listed in the table, operations and maintenance (O&M) efforts began immediately after remedial actions were implemented.

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TABLE

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Table No. 2-1
Chronology of Site Events

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Event	Description	Date[1,2]
Initial Discovery of Contamination	Installation Restoration Program Phase I, Records Search (Engineering-Science, 1982)	July 1981
Pre-NPL Responses	Installation Restoration Program Phase II, Confirmation/Quantification (Water and Air Research, Inc., March 1985)	April 1982
NPL Listing	--	1987
Remedial Investigation (RI) Completed	OU3	1993
Feasibility Study (FS) Completed	OU1 and OU3	September 1999
	OU2	September 2002
ROD Signatures	OU1 Interim ROD	June 1991
	OU2 Interim ROD	February 1994
	OU3 Interim ROD	August 1995
	OU1 and OU3 Final ROD	September 2004
ROD Amendments, Explanation of Significant Differences (ESD), and Agency Position Letters	OU2, Disassociation from NPL Site and Transfer to Resource Conservation and Recovery Act (RCRA)	August 2003
Enforcement Documents (Consent Decree, Administrative Order on Consent, Unilateral Administrative Order)	None	--
Remedial Design Start	OU1, Leachate Collection Pilot	April 1991
	OU1, Run-On Control	October 1991
	OU1, Sludge Lagoon	October 1991
	OU1, Leachate Collection Full Scale	October 1991
	OU1, Cover Renovation	October 1991
	OU1, Lagoon Groundwater Recovery	October 1991
	OU1, Cover Renovation Redesign	June 1996
	OU2, Sediment Containment	May 1995
	OU3, Groundwater Pump and Treat System	August 1995
Remedial Design Complete	OU1, Leachate Collection Pilot	July 1991
	OU1, Run-On Control	January 1992
	OU1, Sludge Lagoon	July 1993
	OU1, Leachate Collection Full Scale	December 1993
	OU1, Cover Renovation: May 1993	May 1993
	OU1, Lagoon Groundwater Recovery	July 1992
	OU1, Cover Renovation Redesign	March 1997
	OU2, Sediment Containment	June 1996
	OU3, Groundwater Pump and Treat System	June 1996
Superfund State Contract, Cooperative Agreement, or Federal Facility Agreement Signature	Federal Facility Agreement	June 1989

Table No. 2-1
Chronology of Site Events

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Event	Description	Date[1,2]
Remedial Action (RA) Implementation Start	OU1, Run-On Control	February 1992
	OU1, Sludge Lagoon	October 1992
	OU1, Leachate Collection Full Scale	October 1992
	OU1, Cover Renovation	August 1987
	OU2, Sediment Containment	September 2000
	OU3, Groundwater Pump and Treat System	June 1997
Remedial Action (RA) Implementation/Construction Complete	OU1, Run-On Control	June 1992
	OU1, Sludge Lagoon	September 1996
	OU1, Leachate Collection Full Scale	October 1997
	OU1, Cover Renovation	September 1998
	OU2, Sediment Containment	September 2000
	OU3, Groundwater Pump and Treat System	October 1997
Remedial Process Optimization (RPO)	OU1, Leachate Collection Pump Station LF4PS3 shut down with regulatory approval	March 1999
	OU1, Leachate Collection Pump Stations LF4PS1, LF4PS2, and LF4PS4 shut down with regulatory approval	May 2002
	OU3, Recovery Well RW1 shut down with regulatory approval	February 1999
	OU3, Recovery Wells RW2, RW3, and RW6 shut down with regulatory approval	May 2002
Previous Five-Year Reviews	First Five-Year Review Report	July 2001

Note:
[1] - These dates may vary from regulatory dates.
[2] - Some of the remedial action/construction activities may have begun as an interim measure before the final remedial design was completed/approved.

3.0 BACKGROUND

3.1 PHYSICAL CHARACTERISTICS

3.1.1 Site Location

Robins AFB is located in central Georgia approximately 18 miles south of Macon, Georgia. It is bounded on the west by the City of Warner Robins, on the north by a housing subdivision and wetlands in Houston County, on the south by unincorporated Bonaire, and on the east by the Ocmulgee River and its floodplain. The Robins AFB property encompasses an area of approximately 8,435 acres. As one of the most active Air Force Materiel Command (AFMC) bases, Robins AFB, through its host unit, the Warner Robins Air Logistics Center (WR-ALC), performs Programmed Depot Maintenance (PDM) and other support activities on a variety of aircraft. Robins AFB contains over 14 million square feet (sq ft) of operational facilities and supports 1,400 housing units. The NPL site is located centrally within the Base boundaries as shown in Figure 3-1. The site, encompassing approximately 45-acres, is bounded by base industrial facilities to the west and northwest, wetlands and the flightline to the north, wetlands to the east, and wooded areas and base housing to the south (Figure 3-2).

3.1.2 Site Hydrogeology and Conceptual Model

The cross-section depicted on Figure 3-3 illustrates a hydrogeologic model for the NPL site. The following hydrogeologic units are present in the area:

- surficial aquifer;
- Quaternary alluvial aquifer;
- upper Providence aquifer;
- lower Providence aquifer;
- Cusseta (aquitard); and

- Bluffftown aquifer (not shown on Figure 3-3).

These hydrogeologic units are consistent with those found elsewhere across the Base. Groundwater flow in all units is generally to the east toward the Ocmulgee River floodplain.

The refuse or fill material that comprises LF04 forms a distinct perched surficial aquifer that forms a direct hydraulic connection, both horizontally and vertically, with the underlying aquifers. The horizontal extent of the surficial aquifer is primarily restricted to within the landfill. The groundwater table within the surficial aquifer occurs at or near the ground surface to approximately five ft below ground surface (bgs) and discharges to the wetlands east of the landfill.

The Quaternary alluvial aquifer consists of peat, clay, sand, and gravel layers that overlie the upper Providence aquifer. It extends from the western boundary of LF04 to the Ocmulgee River floodplain to the east. The western extent of the alluvial aquifer is represented on relevant figures by a green dashed line labeled "Approximate Quaternary Alluvium Contact." The alluvium is in direct hydraulic communication with the underlying Providence aquifer, and in most places, it is difficult to distinguish between these two units based on lithology. Below the landfill, there is a downward vertical gradient from the alluvial aquifer into the upper Providence aquifer. East of the landfill, there is an upward vertical gradient and groundwater discharges into the adjacent wetlands and/or the Ocmulgee River floodplain. The majority of the groundwater contamination associated with the NPL site is present within the alluvial aquifer and, for this reason, the groundwater recovery wells are screened in this aquifer.

The Providence aquifer consists of fine to coarse-grained sand with interlayered silt and clay. This aquifer outcrops over the west side of the Base and underlies the alluvial aquifer to the east. The Providence aquifer is subdivided into upper and lower units primarily because of the aquifer's thickness and to facilitate discussions of hydrogeology and the extent of groundwater contaminant plumes. The division between the upper and lower Providence aquifers has been arbitrarily assigned an elevation range of approximately 180 to 210 ft above Mean Sea Level (MSL). The Providence aquifer is not used for drinking water supply at the Base or in the immediate vicinity of the Base.

Below the Providence aquifer is the Cusseta, which acts as an aquitard to the underlying Blufftown aquifer. The Cusseta is reported to include two layers of clay, each 10 to 15 ft thick, separated by a sandy zone 30 to 40 ft thick.

The Blufftown aquifer, comprised of the Eutaw-Blufftown geologic units, forms an exceptionally thick unit (thought to exceed 350 ft of productive aquifer). Potable and process water is produced from the Blufftown aquifer using water supply wells at the Base.

3.2 LAND AND RESOURCE USE

Historic land use of the NPL site consisted of: (i) LF04, a 45-acre landfill, which operated from 1965 to 1978 for the disposal of general refuse and industrial wastes; and (ii) WP14, a 1.5-acre unlined lagoon, used from 1962 to 1978 for the disposal of industrial waste treatment plant (IWTP) sludge (including electroplating sludge) and other miscellaneous industrial wastes, such as solvents and oils.

Currently, land use at the NPL site is non-residential, and future land use is to remain non-residential. As indicated in the Final ROD, non-residential use excludes uses typically associated with permanent, human habitation and working environments, but may include uses related to intermittent human contact that pose no threat to human health or the environment. Land use in the vicinity of the NPL site varies from wetlands to the north and east; industrial uses to the west and northwest; and residential to the south. Groundwater beneath the NPL site is not currently used for drinking water or irrigation. It is not anticipated that groundwater will be utilized as a drinking water resource from the surficial, alluvial, or upper and lower Providence aquifers.

3.3 HISTORY OF CONTAMINATION

Site investigations at LF04, WP14, and the adjacent wetlands began in 1980 (Law Engineering Testing Company, 1980). In 1982, Robins AFB conducted a basewide survey to identify and assess past hazardous waste disposal practices (Engineering-Science, 1982). LF04 and WP14 were identified as comprising an area with high potential for groundwater contamination and, as a result, were placed on the NPL under CERCLA in 1987.

In 1989, Robins AFB entered into a Federal Facilities Agreement (FFA) with the Georgia Department of Natural Resources (DNR), Environmental Protection Division (GA EPD), and the United States Environmental Protection Agency (US EPA) to establish procedures for developing, implementing, and monitoring appropriate response actions in accordance with CERCLA, the NCP, and the Georgia Waste Management Act.

3.4 INITIAL RESPONSE

While Remedial Investigation (RI) activities were ongoing in the early 1990's, interim RODs were developed in 1991 for OU1 and in 1995 for OU3. Based on the findings of the RI activities (CH2MHill, 1990 and CH2MHill, 1993), and in accordance with the interim RODs, Robins AFB began implementing the following interim measures (IMs).

- In 1996, Robins AFB remediated WP14 by first treating the waste mass using in-situ volatilization followed by excavation, solidification, and replacement methods.
- In 1997, six groundwater recovery wells (RW1 through RW6) were installed along the northeastern perimeter of LF04, and four leachate pump stations (LF4PS1 through

LF4PS4), also referred to as toe drains, were installed around the eastern half of LF04 (Figure 3-4).

- In 1998, a landfill cover system consisting of a geocomposite liner system and a passive landfill gas extraction system was constructed (Figure 3-5A and 3-5B). Additionally, a run-on diversion structure was installed next to LF04.
- A Feasibility Study (FS) was finalized in 1999 in support of the Final ROD. The Final ROD was approved in 2004.

Monitoring and recovery wells installed as part of RI and IM activities and used to monitor the performance of the groundwater recovery system during the 2005 basewide sampling event are shown on Figure 3-6. It is noted that historically the groundwater monitoring well network included more wells. It should be noted that prior to 2002 the groundwater monitoring well network included more wells. However, based on an agreement with the regulators (documented in a December 2001 letter from the Georgia EPD), sampling from several of these wells was either discontinued or reduced in frequency, because the analytical results demonstrated that the groundwater at these locations was essentially clean.

3.5 BASIS OF TAKING ACTION

Based on the initial site investigations conducted at the NPL site, a list of potential contaminants of concern (COCs) were identified through Baseline Risk Assessments (BRAs). Overall, the results of the quantitative risk characterization in the BRAs indicated that there were unacceptable cancer risks and non-cancer hazards to potential human receptors associated with site-related COCs under a hypothetical future residential land use scenario. Therefore, further site investigations and implementation of interim measures was required. This list of potential COCs was further evaluated and modified through the process of additional site investigations and implementation of interim measures, and it was finalized in the Final ROD. Table 3-1 summarizes the final COCs and their respective Maximum Containment Levels (MCLs)/Remedial Levels (RLs). These final COCs are applicable only to OU3. No COCs were identified in the Final ROD for OU1.

TABLE

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Table No. 3-1
Contaminants of Concern for NPL Site OU3 (Groundwater)

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Chemical		MCL/RL [1] (µg/l)	Aquifer		
			Surficial	Quaternary	Upper Providence
VOCs	Benzene	5	X		
	Carbon Tetrachloride	5		X	X
	Chlorobenzene	100	X	X	
	Cis-1,2-dichloroethene	70	X		
	Tetrachloroethene	5	X	X	X
	Trichloroethene	5	X	X	X
	Vinyl chloride	2		X	
Metals	Arsenic	10 [2]	X		
	Cadmium	5	X		
	Chromium	100	X		
	Lead	15 [3]	X		

Notes:

MCL - Maximum Contaminant Level.

RL - Remedial Level.

-- µg/L - micrograms per liter.

[1] - If not otherwise specified, RLs are equal to MCLs for Drinking Water (Drinking Water Regulations and Health Advisories, July 2002).

[2] - The Final ROD completed in 2004 cites an arsenic MCL of 5 µg/L. However, the most recent MCL for arsenic of 10 µg/L was promulgated on 22 January 2001 (66 Federal Register (FR) 6976). This was acknowledged in a table footnote in the First Five-Year Review Report, but not in the Final ROD.

[3] - MCL is the tap action level.

FIGURES

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LEGEND

- ROBINS AFB
- LF04 BOUNDARY
- FORMER SLUDGE LAGOON (WP14)

NOTES:
1. AERIAL PHOTO TAKEN MARCH 2005.
2. THE NPL SITE CONSISTS OF OU1 AND OU3.

OU1 IS DEFINED AS SOURCE AREAS ASSOCIATED WITH LF04 AND WP14. THE EXTENT OF OU1 IS DEFINED BY THE PHYSICAL LF04 BOUNDARY.

OU3 IS DEFINED AS THE GROUNDWATER IMPACTED BY THE OU1 SOURCE AREAS. THE EXTENT OF OU3 CHANGES OVER TIME BASED ON GROUNDWATER CONTAMINANT CONCENTRATIONS.

0 1,300 2,600 5,200 Feet

WRALC
ROBINS AIR FORCE BASE, GEORGIA

PREPARED BY	GeoSyntec Consultants WARNER ROBINS, GEORGIA		
PROJECT NO.	GW0039/9/1		
DOCUMENT NO.	GA060142		
FILE NO.	FIG3-1.MXD		
PREPARED BY	WL	DATE:	04/10/2006
CHECKED BY	TH	DATE:	04/11/2006

PREPARED FOR
ENVIRONMENTAL MANAGEMENT ROBINS AFB
DELIVERY ORDER Q601
TASK NO. 9

PROJECT NAME	SECOND FIVE-YEAR REVIEW REPORT FOR THE NPL SITE, OU1 AND OU3
SITE DESCRIPTION	ROBINS AFB, GEORGIA
FIGURE DESCRIPTION: ROBINS AFB LOCATION MAP	FIGURE NO. 3-1

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N

LEGEND

LF04 BOUNDARY

FORMER SLUDGE LAGOON (WP14)

NOTES:
1. AERIAL PHOTO TAKEN MARCH 2005.
2. THE NPL SITE CONSISTS OF OU1 AND OU3.

OU1 IS DEFINED AS SOURCE AREAS ASSOCIATED WITH LF04 AND WP14. THE EXTENT OF OU1 IS DEFINED BY THE PHYSICAL LF04 BOUNDARY.

OU3 IS DEFINED AS THE GROUNDWATER IMPACTED BY THE OU1 SOURCE AREAS. THE EXTENT OF OU3 CHANGES OVER TIME BASED ON GROUNDWATER CONTAMINANT CONCENTRATIONS.

0 200 400 800 Feet

WR-ALC
ROBINS AIR FORCE BASE, GEORGIA

PREPARED BY GeoSyntec Consultants WARNER ROBINS, GEORGIA				PREPARED FOR	PROJECT NAME SECOND FIVE-YEAR REVIEW REPORT FOR THE NPL SITE, OU1 AND OU3	
PROJECT NO.	GW0039/9/1				SITE DESCRIPTION ROBINS AFB, GEORGIA	
DOCUMENT NO.	GA060142					
FILE NO.	FIG3-2.MXD				FIGURE DESCRIPTION NPL SITE MAP	FIGURE NO. 3-2
PREPARED BY	WL	DATE:	04/10/2006	DELIVERY ORDER Q601 TASK NO. 9		
CHECKED BY	TH	DATE:	04/11/2006			

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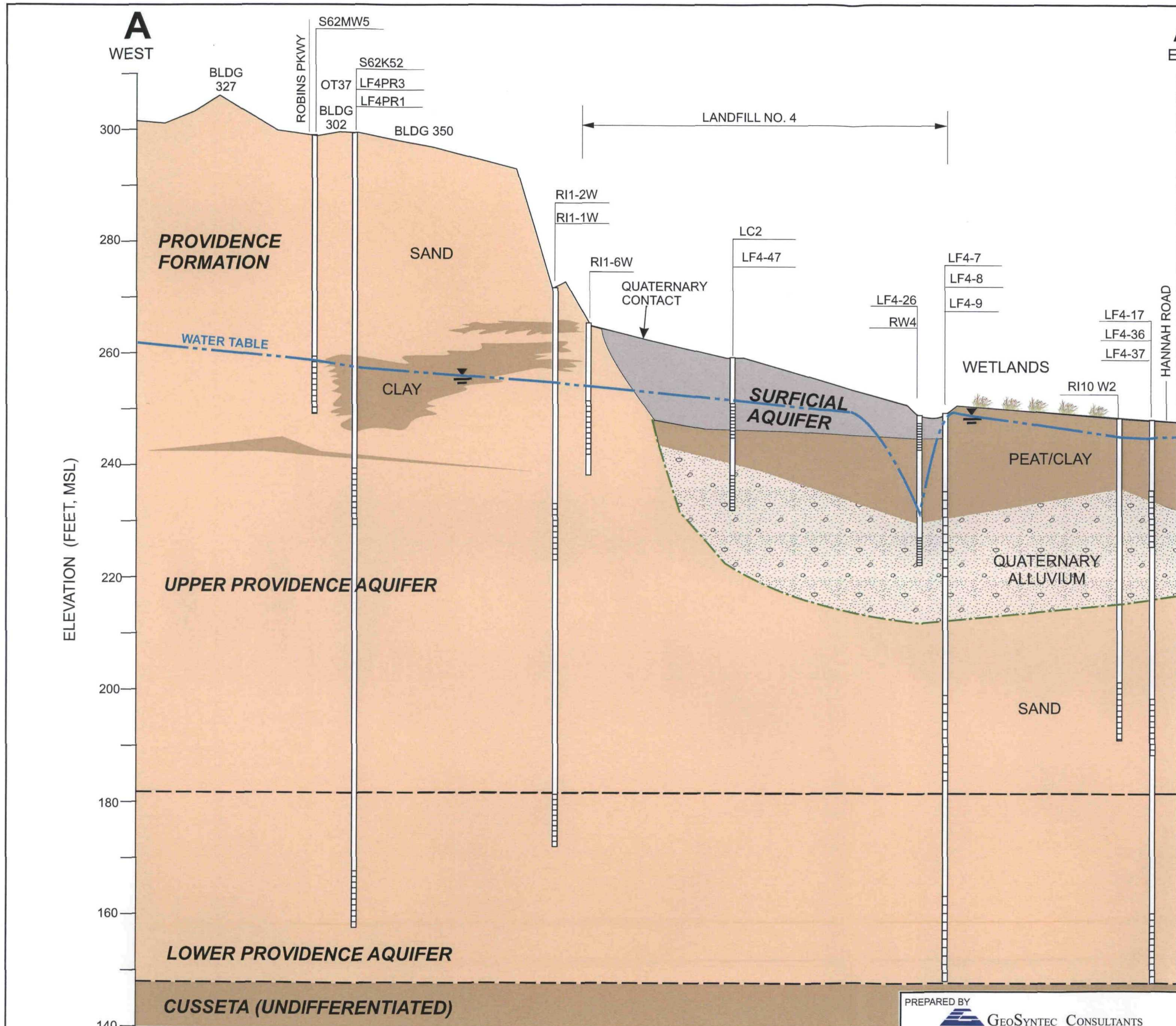

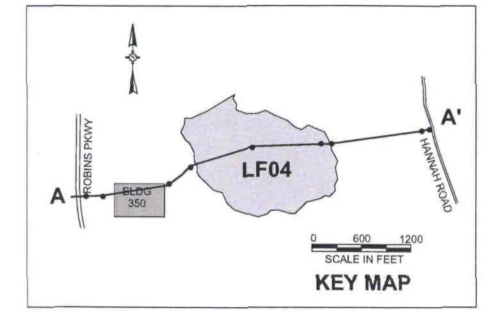

HOR 0 300 600

VER 0 10 20

SCALE IN FEET

NOTE: THE WATER TABLE SHOWN ON THIS FIGURE REPRESENTS THE QUATERNARY ALLUVIAL AND UPPER PROVIDENCE AQUIFERS.

WRALC

ROBINS AIR FORCE BASE, GEORGIA

PREPARED BY	GEOSYNTEC CONSULTANTS, WARNER ROBINS, GEORGIA		
PROJECT NO.	GW0039/9/1		
DOCUMENT NO.	GA060142		
FILE NO.	FIG-3-3.CDR		
PREPARED BY	AST	DATE	04/12/2006
CHECKED BY	CS	DATE	04/12/2006

PREPARED FOR

ENVIRONMENTAL MANAGEMENT ROBINS AFB

DELIVERY ORDER Q601 TASK NO. 9

PROJECT NAME: SECOND FIVE-YEAR REVIEW REPORT FOR THE NPL SITE, OU1 AND OU3

SITE DESCRIPTION: ROBINS AFB, GEORGIA

FIGURE DESCRIPTION: HYDROGEOLOGIC CROSS-SECTION

FIGURE NO. 3-3

N:\ROBINS

NOTES:
1. RW1 WAS SHUT DOWN WITH REGULATORY APPROVAL IN FEBRUARY 1999. RW1 WAS TEMPORARILY REACTIVATED FROM 24 FEBRUARY 2005 TO 1 JUNE 2005.
2. RW2, RW3, AND RW6 WERE SHUT DOWN WITH REGULATORY APPROVAL IN MAY 2002.
3. LF4PS3 WAS SHUT DOWN WITH REGULATORY APPROVAL IN MARCH 1999 AND LF4PS1, LF4PS2, AND LF4PS4 WERE SHUT DOWN WITH REGULATORY APPROVAL IN MAY 2002.

WRALC
ROBINS AIR FORCE BASE, GEORGIA

PREPARED BY	GeoSyntec Consultants, WARNER ROBINS, GEORGIA
PROJECT NO.	GW0039/9/1
DOCUMENT NO.	GA060142
FILE NO.	FIG3-4.MXD
PREPARED BY WL	DATE: 04/10/2006
CHECKED BY TH	DATE: 04/11/2006
PREPARED FOR	ENVIRONMENTAL MANAGEMENT, ROBINS AFB — DELIVERY ORDER Q601 TASK NO. 9
PROJECT NAME	SECOND FIVE-YEAR REVIEW REPORT FOR THE NPL SITE, OU1 AND OU3
SITE DESCRIPTION	ROBINS AFB, GEORGIA
FIGURE DESCRIPTION	NPL SITE LAYOUT
FIGURE NO.	3-4

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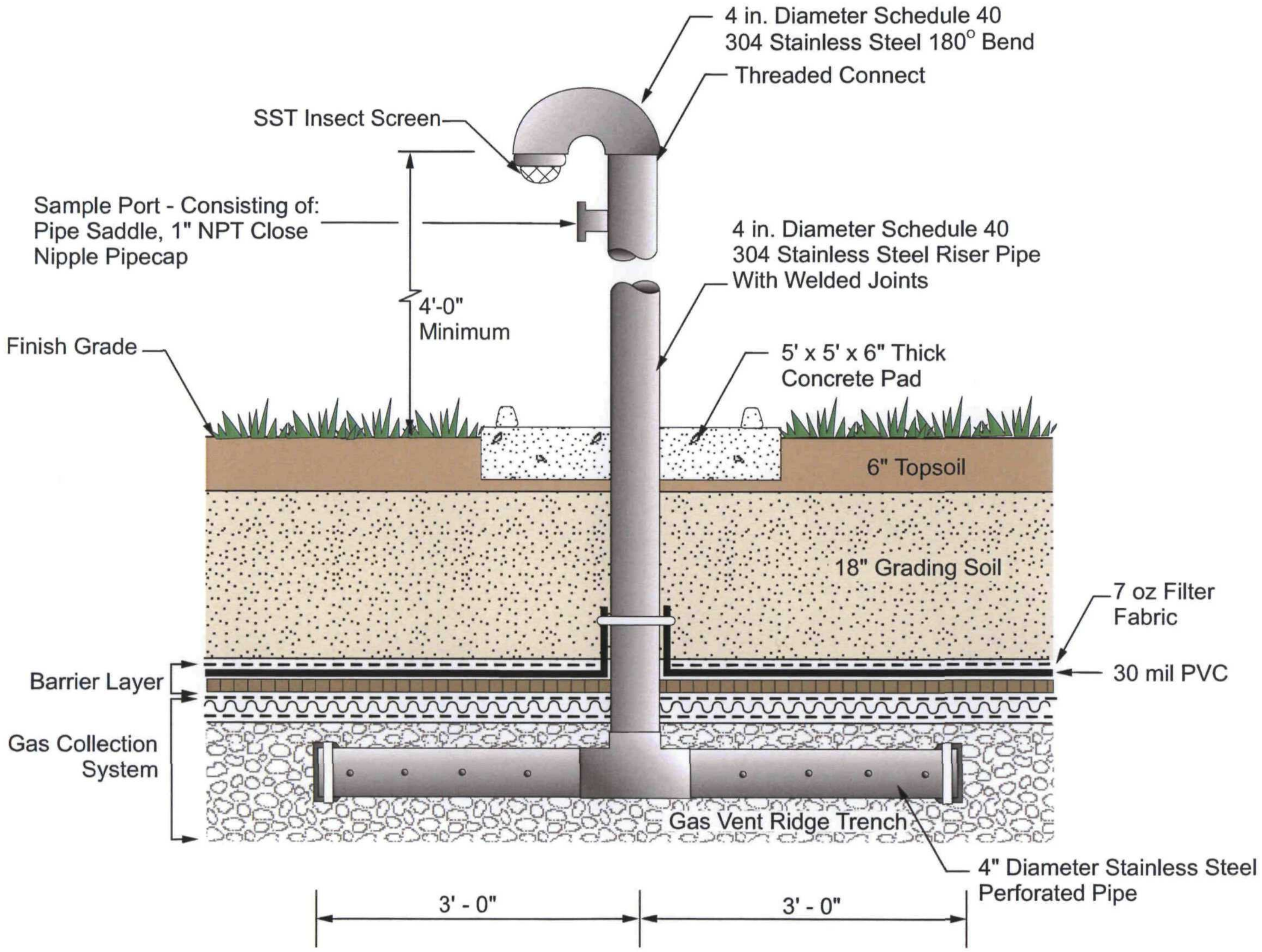
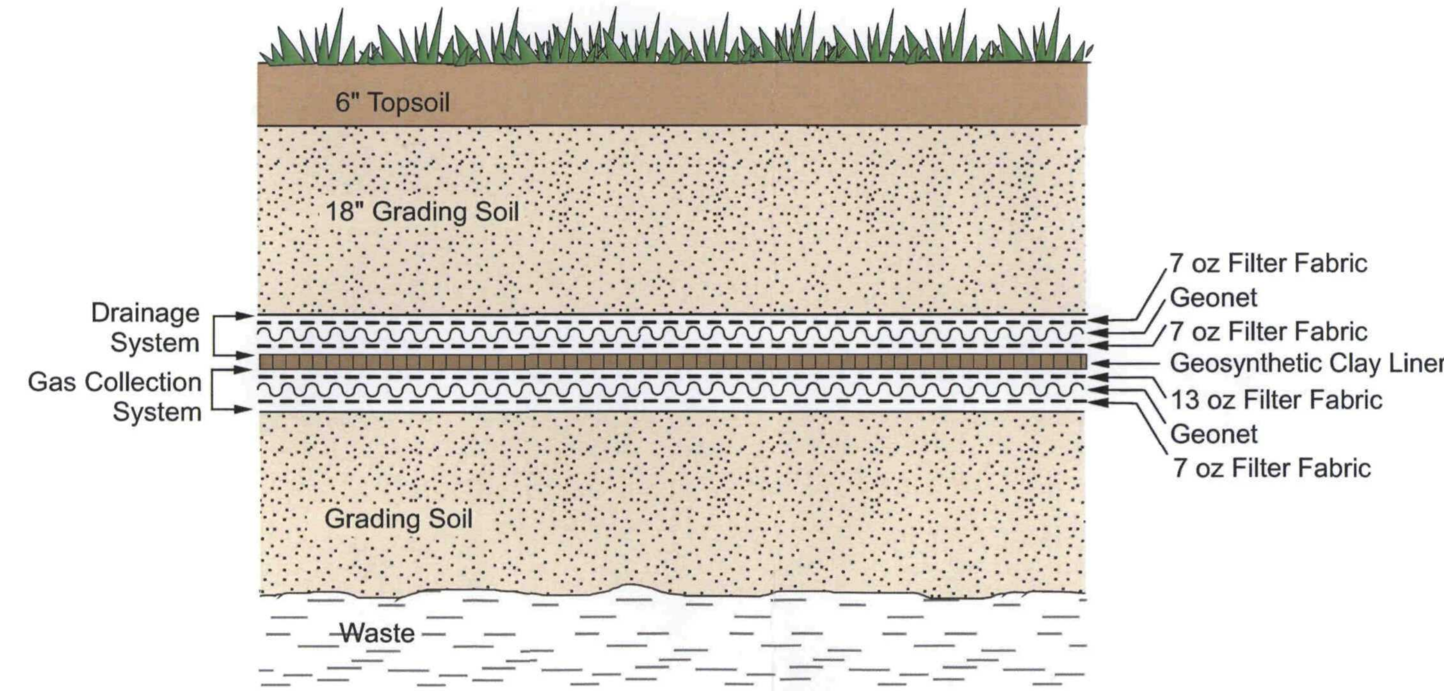
TYPICAL PASSIVE GAS VENT SCHEMATIC

(SOURCE: LANDFILL COVER RENOVATION DESIGN, LOCKHEED MARTIN, 1997)



TYPICAL LANDFILL NO. 4 (LF04) AND SLUDGE LAGOON COVER SYSTEM

(SOURCE: FINAL RECORD OF DECISION (ROD), FOR THE NATIONAL PRIORITIES LIST (NPL) SITE, OPERABLE UNITS (OUs) 1 AND 3, EARTH TECH, SEPTEMBER 2004)



WRALC
ROBINS AIR FORCE BASE, GEORGIA

PREPARED BY: GEOSYNTEC CONSULTANTS, WARNER ROBINS, GEORGIA			
PROJECT NO.	GW0039/9/1		
DOCUMENT NO.	GA060142		
FILE NO.	FIG-3-5A.CDR		
PREPARED BY	AST	DATE	04/12/2006
CHECKED BY	CG	DATE	04/12/2006

PREPARED FOR: ENVIRONMENTAL MANAGEMENT, ROBINS AFB
DELIVERY ORDER Q601, TASK NO. 9

PROJECT NAME: SECOND FIVE-YEAR REVIEW REPORT FOR THE NPL SITE, OU1 AND OU3

SITE DESCRIPTION: ROBINS AFB, GEORGIA

FIGURE DESCRIPTION: TYPICAL GAS VENT AND COVER SYSTEM

FIGURE NO. 3-5A

N:\ROBINS

N

LEGEND

- STORM WATER DRAINS
- GAS VENT PIPING
- GAS VENT LOCATION
- LF04 BOUNDARY
- FORMER SLUDGE LAGOON (WP 14)

NOTES:
1. AERIAL PHOTO TAKEN MARCH 2005.

0 100 200 400 Feet

ROBINS AIR FORCE BASE, GEORGIA

PREPARED BY: GeoSyntec Consultants, WARNER ROBINS, GEORGIA			
PROJECT NO.	GW0039/9/1		
DOCUMENT NO.	GA060142		
FILE NO.	FIG3-5B.MXD		
PREPARED BY	WL	DATE:	04/10/2006
CHECKED BY	TH	DATE:	04/11/2006

PREPARED FOR
ENVIRONMENTAL MANAGEMENT ROBINS AFB
DELIVERY ORDER Q601
TASK NO. 9

PROJECT NAME: SECOND FIVE-YEAR REVIEW REPORT FOR THE NPL SITE, OU1 AND OU3

SITE DESCRIPTION: ROBINS AFB, GEORGIA

FIGURE DESCRIPTION: GAS VENTS, PIPING, AND STORM WATER DRAIN LOCATIONS

FIGURE NO. 3-5B

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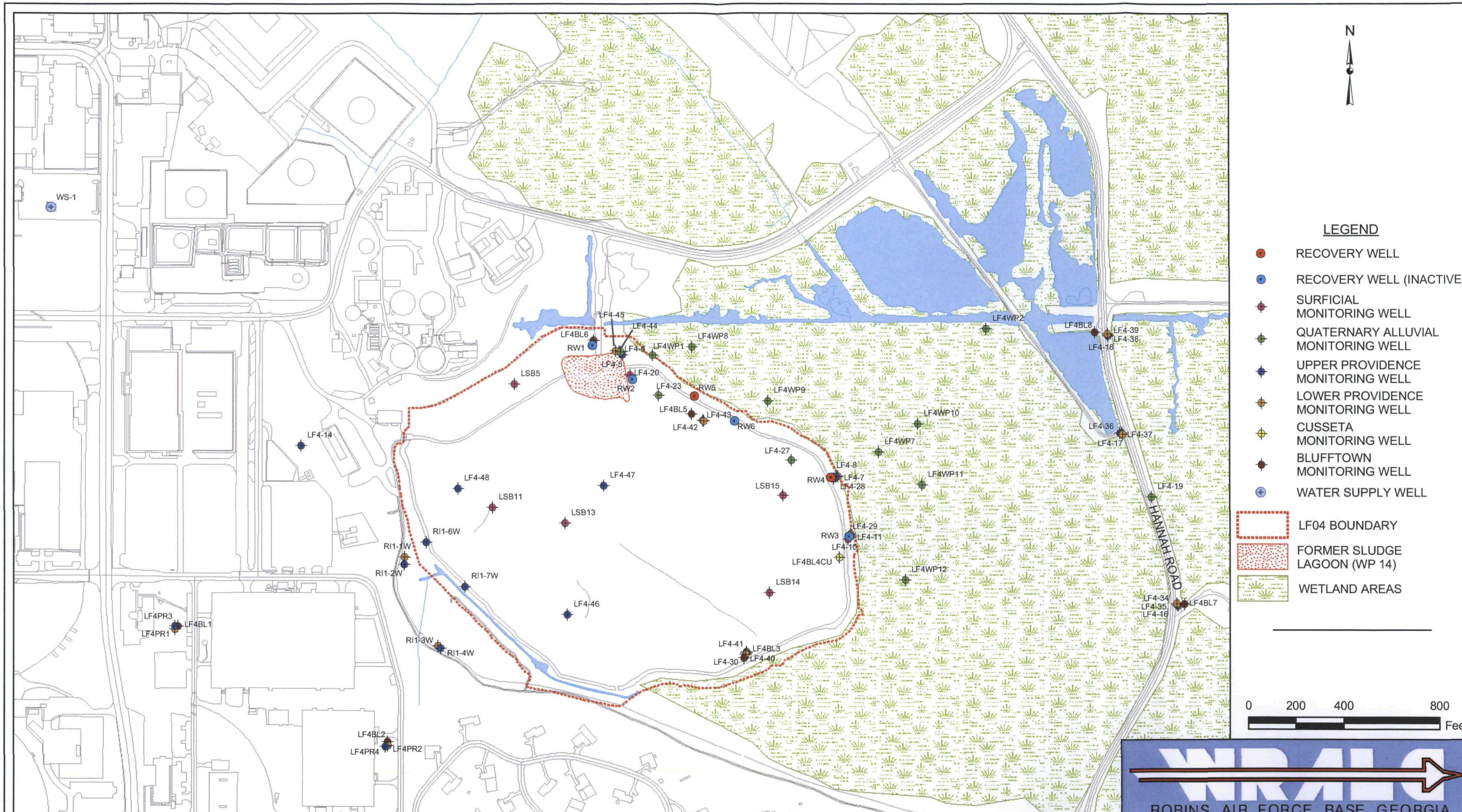

PREPARED BY	GeoSyntec Consultants, WARNER ROBINS, GEORGIA		
PROJECT NO.	GW0039/9/1		
DOCUMENT NO.	GA060142		
FILE NO.	FIG3-6.MXD		
PREPARED BY	WL	DATE:	04/12/2006
CHECKED BY	TH	DATE:	04/12/2006

PREPARED FOR

ENVIRONMENTAL MANAGEMENT ROBINS AFB

DELIVERY ORDER Q601
TASK NO. 9

PROJECT NAME
SECOND FIVE-YEAR REVIEW REPORT FOR THE NPL SITE, OU1 AND OU3

SITE DESCRIPTION
ROBINS AFB, GEORGIA

FIGURE DESCRIPTION
NPL SITE RECOVERY AND MONITORING WELL NETWORK

FIGURE NO.
3-6

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4.0 REMEDIAL ACTIONS

4.1 REMEDY SELECTION

The Final ROD for OU1 and OU3 was approved by the US EPA in September 2004. As stated therein, the remedial action objectives (RAOs) for OU1 are containment and exposure control through source area treatment, construction of a landfill cover system with a passive gas venting system, surface water controls, and institutional/land use controls (LUCs). The RAOs for OU3 are: (i) achieve containment and exposure control; (ii) prevent potential impact to adjacent wetlands; and (iii) restore groundwater to MCLs through construction and operation of a groundwater recovery and treatment system, as well as implementation of LUCs.

The Final ROD also states that continual optimization of the groundwater recovery system should be performed by evaluating the system efficiency and effectiveness. Based on this evaluation, the ROD states that, with proper technical evidence, the decision to modify the site remediation approach from an active groundwater recovery system to a more cost effective monitored natural attenuation (MNA) remedy can be made.

4.2 REMEDY IMPLEMENTATION

The remedy instituted to meet the ROD objectives consists of the following major components:

- For OU1, containment and exposure controls have been in place since the completion of interim measures in 1998. The interim measures included source area treatment, the landfill cover system, passive venting of the landfill gas, and surface water controls.
- For OU3, the groundwater recovery system is comprised of a series of six recovery wells (RW1 through RW6) and four leachate pump stations (LF4PS1 through LF4PS4) installed in 1997. The following wells and leachate pump stations have

been shut down with regulatory approval over time due to low mass removal rates as a result of successful remediation of groundwater contaminants to levels near or below MCLs: (i) RW1 (February 1999); (ii) RW2, RW3, and RW6 (May 2002); (iii) LF4PS3 (March 1999); and (iv) LF4PS1, LF4PS2, and LF4PS4 (May 2002). During 2005, RW1 was temporarily reactivated due to slight rebound in contaminant concentrations (i.e., the TCE concentration at RW1 slowly increased from below the MCL in 2000 to 30 ppb in 2004).

- Groundwater collected from the recovery wells is pumped to the Base's Groundwater Treatment Plant (GWTP).
- Continual inspection and maintenance activities and LUCs have been implemented to restrict access to the site (land and groundwater) and future land use.

4.3 SYSTEM OPERATIONS AND MAINTENANCE (O&M)

Annual O&M activities are preformed as prescribed in the "*Operation and Maintenance Manual for Solid Waste Management Unit (SWMU) 20/OT20 Interim Measures, SWMU 4/LF04 OU3 Interim Record of Decision, SWMU 3, 6, and 13/LF03, FT06 and WP13 Corrective Action Plan, SWMU 17 and 24/OT17 Corrective Action Plan, and Groundwater Treatment System*" dated September 2002 (herein referred to as O&M Manual (Earth Tech, 2002)) and the Final ROD.

O&M activities at OU1 include the following:

- quarterly measurement of landfill gas concentrations at passive ventilation units to evaluate functionality of the landfill gas control system;
- quarterly inspection of the landfill cover system for any changes that could impact its integrity, such as vegetation, erosion, subsidence, surface water drainage,

groundwater extraction and monitoring system, and the passive landfill gas control system;

- routine periodic maintenance of the cover system, such as mowing, removal of shrubs and trees, restoration of areas experiencing surface erosion, fertilization, and re-vegetation or grassing;
- routine inspection and maintenance of LUCs (e.g., site access controls such as fence, gates, and signage);
- as needed performance of repairs to maintain landfill conditions per design and regulatory requirements; and
- documentation and reporting of O&M activities through O&M reports.

O&M activities for OU3 include the following:

- periodic inspection of the recovery wells and other groundwater recovery system components;
- daily inspection of all GWTP operations;
- daily recording of operational data (e.g., flow rates, water levels in active recovery wells, etc.);
- performance of preventive maintenance and well rehabilitation for system optimization;
- biannual sampling of the active groundwater recovery wells;
- annual sampling of the site groundwater monitoring wells; and
- documentation and reporting of O&M activities through progress reports.

Robins AFB continues to evaluate the performance of the groundwater recovery system at the NPL site and, as necessary, makes improvements to maintain the system at or near optimum levels. As evident from the data to be discussed in 6.4, this approach has proven successful.

The annual O&M costs for 2001 through 2005 are presented in Table 4-1. The NPL site O&M costs include landfill cover and drainage structure maintenance, groundwater sampling and monitoring efforts, monitoring well maintenance, recovery well operation and maintenance, treatment of the recovered groundwater, and reporting. An estimate of the groundwater recovery and treatment system (OU3) O&M costs is included in the 2004 Final ROD as $931,500 annually. In addition, O&M costs for the landfill cover system were estimated in the 1991 Interim ROD for OU1 to range from $30,000 to $43,000 annually (or approximately $47,000 to $67,000 in present value worth based on a three percent annual inflation rate). As seen on Table 4-1, the actual O&M costs for the NPL site (OU1 and OU3) have been below the combined estimates presented above and ranged from $674,600 in 2001 to $867,000 in 2005. In the future, these annual costs are expected to decrease when the remedial approach transitions from groundwater recovery and treatment to a more cost-effective MNA.

TABLE

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Table No. 4-1
Annual Operations and Maintenance Costs

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Dates		Total Cost Rounded to the Nearest $100
From	To	
December 2000	November 2001	$674,600
December 2001	November 2002	$684,700
December 2002	November 2003	$731,100
December 2003	November 2004	$757,000
December 2004	November 2005	$867,000

5.0 PROGRESS SINCE FIRST FIVE-YEAR REVIEW

5.1 SUMMARY OF PREVIOUS FIVE-YEAR REVIEW

The First Five-Year Review Report was approved in July 2001. The review included the interim RODs for OU1, OU2, and OU3. Since this review, OU2 was determined not to be associated with contaminant sources from the NPL site; and therefore, it was transitioned for management under RCRA and is not discussed as part of this second five-year review.

The first five-year review concluded that the remedial actions at OU1 and OU3 effectively protect human health and the environment from exposure to hazardous materials in the landfill and groundwater.

The First Five-Year Review Report identified minor erosion on the landfill cover and recommended that Robins AFB investigate the cause of these erosion problems and make repairs as necessary. In addition, the report also identified a need for optimization of the groundwater recovery system.

5.2 FOLLOW-UP ACTIONS PER PREVIOUS FIVE-YEAR REVIEW

As an example of progress since the first five-year review, Robins AFB investigated the erosion problems and completed surface erosion restoration activities over portions of the landfill cover in the Second Quarter of 2003. Photographs of restored areas are presented in Appendix A to depict the areas at the time of the repair and one year later for comparison. These repairs focused on three relatively small areas, each of about one-half acre or less in size. These three areas consisted of two areas with erosion concerns and one area where the landfill had settled and was subject to surface ponding. Since the implementation of these erosion restoration activities, the conditions of the landfill cover have remained stable.

Additionally, as part of the progress reporting and ongoing RPO efforts, current and historical site data are used to evaluate remedial process effectiveness for OU3. To facilitate these efforts, a review of contaminant concentrations, isoconcentration maps, trend analyses, and mass removal estimates is conducted regularly. The results from this data review are used to optimize the groundwater recovery system. Necessary RPO actions were taken (with regulatory approval) including shutting down RW1 and LF4PS3 (in 1999) and LF4PS1, LF4PS2, LF4PS4, RW2, RW3, and RW6 (in 2002), as a result of successful remediation of groundwater contaminants to levels near or below MCLs. RW4 and RW5 continue to operate and RW1 was operated briefly in 2005 due to a slight rebound in contaminant concentrations (i.e., the TCE concentration at RW1 slowly increased from below the MCL in 2000 to 30 ppb in 2004)).

Site-specific groundwater models are also utilized as RPO tools. These models are maintained and updated as appropriate to meet immediate demands for remediation system optimization and to guide data collection efforts. These updates typically include the following:

- input pumping rates;
- consider revision to recharge based on construction activities and rainfall;
- consider new seepage rates;
- use new groundwater elevations for calibration targets;
- revise model as necessary to re-calibrate heads; and
- validate and refine conceptual site model, as necessary.

6.0 FIVE-YEAR REVIEW PROCESS

6.1 ADMINISTRATION COMPONENTS

Robins AFB initiated the second five-year review process in November 2005. The US EPA and the GA EPD were notified of the initiation of the five-year review process in a meeting held at the US EPA, Region 4 offices in Atlanta, Georgia on December 21, 2005. The five-year review team was led by Mr. Fred Otto and Mr. Philip Manning of the lead agency (i.e., Robins AFB) and included Mr. Dann Spariosu of the US EPA and Ms. Mary Brown and Mr. Brent Rabon of the GA EPD as representatives for the support agencies. The review team also included representatives of GeoSyntec Consultants working to support Robins AFB in preparation of this review report. This second five-year review was completed in June 2006.

6.2 COMMUNITY NOTIFICATION AND INVOLVEMENT

The initiation of the second five-year review process was announced at the January 12, 2006 RAB meeting; these meetings are open to the public. Additionally, the review process was highlighted in the January 2006 RAB Fact Sheet and discussed in the 2005 Community Relations Plan, which are both public documents. Relevant slides from the RAB meeting and a copy of the Fact Sheet are provided in Appendices B.1 and B.2, respectively. The results of this five-year review, including the protectiveness statements, were presented at the June 8, 2006 RAB meeting. Relevant slides from this RAB meeting are provided in Appendix B.3. Additional notifications of the community with regard to the five-year review process and results will be facilitated by announcements at future RAB meetings.

A copy of the approved Second Five-Year Review Report will be placed in the local public library for public access. The information repository can be found at:

- Nola Brantley Memorial Library (also known as Houston County Libraries-Warner Robins Houston County Library)
  721 Watson Boulevard
  Warner Robins, Georgia 31093
  (478) 923-0128
  Contact: Reference Librarian

6.3 DOCUMENT REVIEW

The second five-year review process consisted of a review of relevant documents including the following:

- Interim RODs for OU1 and OU3;
- Final ROD for OU1 and OU3;
- O&M Manual;
- semi-annual and annual remedial progress and O&M reports since the first five-year review; and
- other relevant documents reviewed in preparation of this five-year review.

A more comprehensive list of these documents is provided in Table 6-1.

6.4 DATA REVIEW AND EVALUATION

6.4.1 OU1 Source Areas

Robins AFB completed remediation of WP14 in 1996 as part of an Interim Action where the waste was treated by in-situ volatilization followed by excavation, solidification, and replacement methods. A geocomposite cover system and passive landfill gas ventilation system were installed over the entire surface of LF04, including WP14, as part of cover renovation activities in September 1998. The O&M of the landfill cover began subsequent to this event in October 1998.

Several routine activities have been conducted as part of the long-term cover system O&M program. Quarterly inspections and maintenance activities at the NPL site are performed for the purpose of maintaining the integrity of the landfill cover and are conducted in accordance with the O&M Manual prepared for the landfill cover system. Additionally, as part of the quarterly inspections, an evaluation is conducted to assure that the LUCs are maintained as required by the Final ROD. Results of these activities performed at OU1 in 2005 are discussed in further detail below.

6.4.1.1 Landfill Gas Monitoring

Generally, a landfill goes through four stages of biodegradation with different bacterial types dominating each stage: (i) Stage 1 - aerobic degradation and hydrolysis; (ii) Stage 2 - anaerobic degradation, hydrolysis, and fermentation; (iii) Stage 3 - anaerobic degradation and acetogenesis; and (iv) Stage 4 - anaerobic degradation and methanogenesis. In general, aerobic bacteria live in the presence of molecular oxygen (i.e., Stage 1), and dominate the waste decomposition process during the initial phases of the landfill (i.e., waste deposition). However, as oxygen in the landfill is expended, anaerobic microorganisms begin to dominate the process (i.e., Stages 2 through 4), which is representative of conditions now present at the NPL site.

The principal source of landfill gas is the anaerobic decomposition of organic material in waste, which is also a significant cause of waste settlement in landfills. Gas production rates vary with the composition and age of the waste, its volume, moisture content, and other factors. Municipal solid waste (MSW) landfills and CERCLA sites with MSW can generate a significant quantity of gas over a relatively long time period. Gas generation in a typical MSW landfill can extend over a period of more than 25 years, with peak production rates in the 5 to 10 year period after closure. The rate of gas emissions through a cover system is dependent on the gas generation rate, cover system design (e.g., liner system vs. soil cover), hydrogeology, and characteristics of the gas control system.

The anaerobic decomposition of MSW produces two principal gases, methane (CH_4) and carbon dioxide (CO_2), and much smaller quantities of other gases, including nitrogen, oxygen, sulfides, ammonia, and other constituents, and trace amounts of a variety of non-methane organic compounds, typically including vinyl chloride, ethylbenzene, toluene, and benzene (Tchobanoglous, 1993). Methane and carbon dioxide concentrations may individually constitute 40 to 60 percent of the total landfill gas volume, and therefore, are considered as indicator parameters (especially methane, due to its explosive nature) during monitoring activities.

A passive landfill gas control system was installed at the NPL site as part of cover renovation activities in September 1998 to prevent a buildup of gas pressure that might possibly lead to increased risk of fire and explosion, stability problems, subsurface gas migration, and, for unlined landfills, potential impact on groundwater quality. This system consists of a gas collection layer connected to ridge trenches and passive vertical gas vents consisting of stainless steel riser pipes. Figure 3-5A presents a typical passive gas vent structure for LF04. There are a total of 36 passive gas vents distributed over the landfill surface as shown on Figure 6-1. The number of passive vents is adequate for the size of the landfill and for its intended purposes in accordance with general landfill gas management practices. Considering the type and age of the waste, this passive system should be sufficient to manage gas generation through the remaining life-cycle of the landfill.

In preparation of this report, the most recent data from the 2005 quarterly inspections were used. During 2005, all ground reading measurements were recorded as zero percent methane, indicating that the cover and venting system is effective at preventing pressure buildup and uncontrolled gas leaks. The methane gas readings collected from the passive vents were generally consistent with historic values as presented in Appendix C. The 2005 average methane concentrations for individual vents ranged from zero to 49 percent methane by volume. As presented in Table 6-2, the average methane concentration for LF04 (all vents combined) in 2005 was 19 percent methane by volume. The annual average methane concentrations as well as the annual rainfall data for periods 2001 through 2005 are also presented in Table 6-2 for comparison purposes.

The landfill gas concentrations and trends have historically been analyzed for three arbitrary geographic divisions of the landfill referred to as Area 1, Area 2, and Area 3 (see Figure 6-1). These areas were previously established by dividing the landfill into three areas with an approximately equal number of gas vents. The average gas vent readings for Area 1 are generally lower than the Area 2 and Area 3 readings, which could be attributed to the ages and/or types of wastes disposed in a given area and their associated moisture contents. Table 6-2 includes area specific methane concentration averages.

A review of the currently available information (i.e., age and type of the landfill, and quarterly gas readings) combined with the visual observations of the cover system indicates that the passive landfill gas control system appears to function as intended in preventing undesired gas pressure buildup beneath the cover system. The variations in methane concentrations are likely due to changes in general weather conditions and fluctuations of waste moisture content. It is probable that the variation in the elevation of the groundwater table influences the waste moisture content within the unlined landfill. For those types of landfills with conditions similar to the NPL site, where the decomposition of solid waste occurs through an anaerobic biodegradation process, higher moisture available to the waste results in increased microbial activity, and thus, increased landfill gas generation.

6.4.1.2 Landfill Cover Conditions

Quarterly inspections of the landfill cover are conducted to assess: (i) the general condition of the vegetative cover; (ii) the evidence of erosion; and (iii) the functionality of the gas vents and storm water drainage features.

Based on the review of the 2005 annual inspection reports, the vegetation appeared to sustain itself amid periods of hot summer weather and throughout relatively dry periods. No evidence of erosion was noted during the 2005 quarterly landfill cover inspections, and therefore, restoration of areas due to surface erosion was not necessary. Photographic documentation of the landfill cover conditions in June 2005 are presented in Appendix D.

The 2005 inspections revealed that the inlet and outlet drainage structures were generally clear and appeared to be functioning as intended. Routine maintenance activities (i.e., clearing of encroaching vegetation) have been conducted periodically on the drain outlet areas to improve access to the drain outlets and to prevent potential clogging or blockage.

The inspection of gas vents for any structural damage revealed that the integrity and the functionality of gas vents are maintained in good condition.

Landfill cover maintenance consists of mowing, removal of trees and shrubs, restoration of surface erosion, fertilization, and re-vegetation or grassing, as necessary.

6.4.1.3 Land Use Controls (LUCs)

The final remedy for OU1 is containment through maintenance of the engineered landfill cover system as well as the implementation of LUCs to limit site access, use and activity. The term "land use control" or "LUC", as specified in the Final ROD, is defined as "any restriction or control arising from the need to protect human health and the environment that limits the use of and/or exposure to environmentally contaminated media (e.g., soils, surface water, and groundwater)". The term includes controls on access, consisting of engineered and non-engineered mechanisms, affirmative measures to achieve the desired control, prohibitive directives, and "institutional controls".

As the lead agency, Robins AFB is responsible for implementing and enforcing all LUCs at the NPL site. These LUCs are to be maintained until the concentration of hazardous substances in the soil (OU1) and the groundwater (OU3) beneath have been reduced to levels that allow for unlimited exposure and unrestricted use. At present, in accordance with the imposed LUCs that are in place at the NPL site, the land will continue to be used for non-residential purposes conforming to the provisions established in the Final ROD.

The LUC objective for OU1 is to protect human health and the environment by preventing direct contact with contaminated soil and solidified sludge under the engineered landfill cover. The LUC objective for OU3 is the protection of human health and the environment by preventing direct contact with, or consumption of, contaminated groundwater (OU3) by maintaining the integrity of the engineered landfill cover and restricting access to the groundwater.

To meet these objectives, Robins AFB has implemented several LUCs as documented in the Base Comprehensive Plan. Controls on access include the perimeter fence, secured access gates, and contiguous wetland areas, which inhibit accessibility to the landfill location. The landfill cover system also provides additional barrier protection and a buffer zone which acts to secure the underlying waste material. Additionally, ingress/egress to the landfill is restricted to authorized personnel only. Prohibitive directives for the landfill include site specific excavation limitations restricted primarily to well-defined/documented landfill O&M activities, as well as prohibition of drinking or potable water supply wells within OU3. Environmental Management Division personnel who are knowledgeable of the LUCs review and coordinate on all Civil

Engineering work requests. This includes maintaining a representative on the Dig Permit Committee to review and approve all proposed ground disturbing activities, including any well drilling within the OU1 and OU3 areas, to ensure that no activities violate the LUC restrictions.

Quarterly inspections are performed to verify that all necessary LUCs are being implemented and are being properly maintained. Since the LUCs were implemented, the quarterly inspections have not revealed activities inconsistent with the LUC objectives, or use restrictions, or any actions that may interfere with the effectiveness of the LUCs. LUCs are being properly implemented to prevent uncontrolled exposure to contaminated soil, solidified sludge, and/or groundwater. Photographic documentation of LUCs in place during the most recent inspection is included in Appendix E.

6.4.2 OU3 Site Groundwater

The groundwater recovery and treatment system was constructed and began operation in 1997 as part of an interim measure for OU3. The O&M of the groundwater recovery and treatment system began subsequent to this event. The remedial progress for OU3 is being monitored through groundwater sampling events and documented and reported in progress reports submitted to the US EPA and GA EPD. Results of these activities conducted for OU3 in 2005 are provided below.

6.4.2.1 Operation Flow Rates

LF04 recovery wells are equipped with flow meters that record groundwater recovery flow rates on a continual basis. A summary of historic annual flow data for each recovery well is presented in Table 6-3. Yearly average flow rates are calculated based on the operational period of the well. The calculation does not account for periods of temporary shutdowns.

For the most recent operational period (December 2004 through November 2005), the average flow rates for the groundwater recovery system were 27 gallons per minute (gpm) for (intermittently operated) RW1, 46 gpm for RW4, and 39 gpm for RW5. The average flow rates for RW4 and RW5, which operated continuously throughout the most recent reporting period, were generally consistent with those observed in the previous reporting periods. The average flow rate for the entire recovery system at the NPL site during the most recent operation period was 92.5 gpm.

6.4.2.2 Groundwater Level Measurements

Groundwater levels at the site are typically measured during the annual basewide sampling event. Well construction information for monitoring and recovery wells associated with the NPL site and the water level measurement data recorded during the most recent sampling event are presented in Table 6-4.

The most recent groundwater level measurements (i.e., from the 2005 basewide sampling event) were used to generate the potentiometric maps presented on Figures 6-2 through 6-5, for the surficial, Quaternary alluvial, and upper and lower Providence aquifers, respectively. These data were supplemented with water level data from monitoring wells located in surrounding areas. It is noted that the information in Table 6-4 includes data from the NPL site only and the table does not include all data used to construct the potentiometric maps. As shown on these figures, groundwater flow is generally to the east/northeast toward the wetlands and the Ocmulgee River floodplain.

As shown on Figure 6-2, groundwater in the surficial aquifer generally flows from east to west and discharges into the Quaternary alluvial aquifer along the eastern perimeter of the landfill where the recovery well network is located. There is a downward vertical hydraulic gradient across the entire surficial aquifer into the underlying alluvial aquifer.

Based on a review of the potentiometric data points for the alluvial and upper and lower Providence aquifers, as shown on Figures 6-3 through 6-5, the vertical component of the hydraulic gradient reverses direction as groundwater flows from west to east. The vertical hydraulic gradient has a downward direction to the west of the site and transitions into an upward vertical gradient toward the center of the landfill and progressively increases in the wetland area east of the landfill. There may be, however, localized exceptions to these conditions (i.e., reversal or amplification of natural gradients and variance in them over time).

6.4.2.3 Groundwater Sampling

The active recovery wells (RW4 and RW5) were sampled twice during the most recent reporting period (in February 2005 and during the annual basewide sampling event in April/May 2005). All other monitoring wells were sampled only once during the most recent reporting period during the annual basewide sampling event in April/May 2005. All samples were analyzed for volatile organic compounds (VOCs). Additionally, the monitoring wells screened in the surficial aquifer were analyzed for inorganics.

Tables 6-5 and 6-6 summarize the 2005 analytical results for the recovery wells and monitoring wells, respectively. For ease of presentation and subsequent evaluation, the following discussion of results is grouped by hydrogeologic unit.

- In the surficial aquifer, two VOCs (i.e., benzene and chlorobenzene) and three inorganics (i.e., antimony, arsenic, and mercury) were detected at or above their respective MCLs. Benzene exceeded the MCL of 5 micrograms per liter (µg/L) at five of the nine surficial aquifer wells at concentrations ranging from 8.1 to 60 µg/L. Chlorobenzene exceeded the MCL of 100 µg/L at two of the nine surficial aquifer wells at concentrations of 140 and 180 µg/L. Generally, the inorganics were detected as either estimated values at very low concentrations or at very low frequencies (i.e., mercury).

- In the Quaternary alluvial aquifer, nine VOCs (1,2-dichlorobenzene, 1,4-dichlorobenzene, benzene, carbon tetrachloride, chlorobenzene, cis-1,2-dichloroethene (cis-DCE), tetrachloroethene (PCE), TCE, and vinyl chloride) were detected at or above their respective MCLs. TCE is the most prevalent COC detected in the alluvial aquifer. TCE concentrations in 12 of 22 alluvial aquifer wells sampled in 2005 were at or below the MCL, while the others slightly exceeded the MCL of 5 µg/L. The highest TCE concentrations were generally found along the northeastern perimeter of LF04, which is the downgradient side of the landfill. The maximum TCE concentration detected in the alluvial aquifer was 72 µg/L in February 2005, at RW4. The VOCs 1,2-dichlorobenzene, 1,4-dichlorobenzene, benzene, and chlorobenzene were detected only at wells in close proximity to the former WP14 (i.e., LF4-6 and LF4WP1) source area. The remaining VOCs were detected sporadically at relatively low concentrations.
- In the upper Providence aquifer, five VOCs (benzene, carbon tetrachloride, chlorobenzene, PCE, and TCE) were detected at or above their respective MCLs. TCE is the most prevalent COC detected in the upper Providence aquifer. In two-thirds of the upper Providence aquifer wells (12 out of 18) sampled in 2005, TCE concentrations were at or below the MCL, while the others exceeded the MCL of 5 µg/L, ranging in concentration from 7.3 to 270 µg/L. The highest TCE concentrations were detected on the western perimeter of LF04, which is the upgradient side of the landfill. These TCE concentrations, along with the other detected VOCs in the upper Providence aquifer, are associated with releases from an upgradient restoration site on the Base referred to as Solid Waste Management Unit

(SWMU) 62 or Other Site 37 (OT37) (see Figure 3-2). A corrective action is currently ongoing at SWMU 62/OT37 to address the elevated TCE concentrations in groundwater on the upgradient side of the NPL site. The OT37 plume is attenuating in place. Other specifics related to the corrective action at SWMU 62/OT37 are not discussed herein, but can be found in the document titled: *"Draft Final Annual Progress Report, December 2004 – November 2005 for SWMU 4/LF04 OU3 Interim Record of Decision; SWMU 20/OT20 Corrective Action Plan; SWMUs 3, 6, and 13/LF03 Corrective Action Plan; SWMUs 17 and 24/OT37 Corrective Action Plan; SWMU 62/OT37 Corrective Action Plan; SWMUs 57 and 61/OT41 Corrective Action Plan; and Groundwater Treatment System."* (GeoSyntec, 2006).

- In the lower Providence aquifer, no contaminants were detected above the MCLs at the 12 monitoring locations.
- In the Cusseta aquitard, no contaminants were detected above the MCLs at the single monitoring location.
- In the Blufftown aquifer, no contaminants were detected above the MCLs at the seven monitoring locations.

6.4.2.4 Evaluation of Remedial Progress

TCE historically has been identified as the primary COC for OU3 groundwater contamination, and therefore, was selected as the indicator parameter for the remedial performance evaluation. During the most recent reporting periods, TCE was not detected at concentrations exceeding the MCLs in the surficial aquifer and lower Providence aquifer, and as such, TCE plume maps have not been prepared for these aquifers.

The current TCE plume configuration (i.e., based on the 2005 basewide sample event) in the alluvial aquifer is depicted on Figure 6-6 and is presented in historic context on Figure 6-7.

Additionally, statistical trend analyses of TCE concentrations of individual wells were conducted to better understand the plume conditions and to evaluate the effectiveness of the remedial action. The nonparametric Mann-Kendall test method described in Appendix F.1 was used in statistical trend analyses of the available data. The available data covers a period from as early as 1989 to present with multiple starting dates reflecting when groundwater samples were first collected from an individual monitoring well. The results of the statistical trend analyses and the full-size graphical presentation of TCE concentration time trends are provided in Appendix F.2. To evaluate concentration trends on a sitewide basis, smaller scale TCE time trend charts for a number of wells are posted on the TCE plume maps presented on Figures 6-8 for the alluvial aquifer. Similarly, the TCE plume configuration in the upper Providence aquifer associated with the SWMU 62/OT37 for the reporting period from December 2004 to November 2005 is depicted on Figure 6-9, with respect to historic context on Figure 6-10, and with time trends on Figure 6-11. The following discussions provide further detail of the contaminant distribution and the remedial action progress for each aquifer.

Contaminant Distribution – Surficial Aquifer

In 1998, the maximum concentrations of TCE and cis-DCE, a degradation daughter product of TCE, were 590 and 1,300 µg/L, respectively. As a result of effective remediation and natural attenuation, the concentrations of TCE and its daughter products have been reduced to levels below their respective MCLs and are no longer detected in the surficial aquifer. Based on the 2005 basewide sampling event results, among the remaining contaminants, benzene is the most widely distributed contaminant, with detections above the MCL at five of the nine wells sampled. As with TCE and cis-DCE, benzene concentrations have decreased with time. The highest concentrations of benzene are detected at the center of the landfill, with concentrations decreasing to non-detect toward the eastern boundary. Based on the current conditions, and the remedial progress described above, the remediation system and natural attenuation process have been effective in treating/containing the benzene contamination in the surficial aquifer.

Contaminant Distribution and Trend Analyses – Alluvial Aquifer

As presented on Figures 6-6 and 6-7, a reduction in TCE contaminant mass in the alluvial aquifer continues to be evident. Further decline in TCE concentrations is depicted by the slightly smaller aerial extent of the 10 µg/L contour line during the most recent reporting period as compared to the previous reporting period.

Historically, as shown on Figure 6-7, TCE concentrations have decreased significantly. In 1997, maximum TCE concentrations were greater than 2,000 µg/L. These have decreased to a maximum of 59 µg/L in 2005, a historic low. Also evident is a significant reduction in the lateral extent of the contaminant plume, which is currently only approximately one-quarter of its 1997 extent.

No statistically significant increasing trends were noted in any of the wells screened in the alluvial aquifer. Seventeen of the wells show a statistically significant decreasing trend. The remaining wells showed no trends and the TCE concentrations were near or below the MCL. TCE time trend charts for a number of wells are posted on the TCE plume map presented on Figure 6-8.

It is evident that the groundwater recovery and treatment system and natural attenuation processes have effectively reduced TCE concentrations in a manner consistent with the achievement of remedial goals for the site. Based on the most recent data, TCE concentrations in many wells have reached a point of asymptotic decline at or near the MCL, whereas in others this objective is being rapidly approached.

Contaminant Distribution and Trend Analyses – Upper Providence Aquifer

As illustrated on Figures 6-6 though 6-11, there are two distinct TCE plumes at the NPL site: (i) the TCE plume located in the upper Providence which originated from SWMU 62/OT37; and (ii) the TCE plume in the Quaternary alluvial groundwater plume associated with the OU1 source areas. The distinction between them is supported by decreasing concentrations at the leading edge of the SWMU 62/OT37 plume (monitoring well LF4-47) and the separation between the two groundwater plumes. It should be noted that the SWMU 62/OT37 groundwater plume is currently being remediated and managed under RCRA through the GA EPD.

6.4.2.5 Mass Removal Estimates

Historical mass removal estimates for individual organic contaminants and total organics at the recovery system are summarized in Table 6-7. Total organics removal from individual wells in the recovery system is summarized in Table 6-8. As can be seen in Table 6-7, it is estimated that the OU3 groundwater recovery system removed approximately 23.4 pounds (lbs) of total organics from the subsurface during the December 2004 through November 2005 reporting period and approximately 397 lbs of total organics since beginning operation in 1997. Approximately 91 percent of the total organics mass removed since 1997 consists of TCE (77 percent) and PCE (14 percent). The other contaminants comprising the total mass of organics removed are: cis-DCE (six percent), chlorobenzene (two percent), benzene (one percent), 1,4-dichlorobenzene (less than one percent), and vinyl chloride (less than one percent).

As can be seen in Table 6-8, RW4 provided the largest contribution to the mass removal during the most recent reporting period (approximately 20 lbs of total organics mass). The observed mass removal rates of this well and RW5 have been decreasing over time. The low removal efficiencies are apparent by the negligible contaminant mass removed per unit volume of groundwater extracted. For example, during the most recent reporting period (December 2004 through November 2005), RW1 removed 0.2 lbs of contaminant per one million gallons (Mgal) of groundwater extracted, RW4 removed 0.8 lbs/Mgal, and RW5 removed 0.1 lbs/Mgal. From OU3, an average of only 0.5 lbs of contaminant were removed per million gallons of groundwater extracted.

Another perspective on treatment efficiency is gained by evaluating the mass of organics removed by individual wells and by the entirety of the recovery system for OU3 and comparing these values to historical data. Historical contaminant-specific mass removal estimates for each recovery well are presented in tabular and graphical form in Appendix G.

6.5 SITE INSPECTION

Site inspections are conducted on a quarterly basis for the purpose of maintaining the integrity of the landfill cover and summarized in annual O&M reports provided to the US EPA and the GA EPD. The inspections of the landfill cover are conducted to assess: (i) the general condition of the vegetative cover; (ii) the evidence of erosion; and (iii) the functionality of the gas vents and storm water drainage features. Additionally, an evaluation is conducted to assure that the LUCs are maintained as required by the Final ROD. The findings of the most recent inspections were summarized in 6.4.1.

Additionally, officials from the US EPA Region 4, the GA EPD, and Robins AFB conducted an inspection of the site on March 9, 2006. A letter from the US EPA documenting this site visit is provided in Appendix H. The general conclusions of this site visit were that the landfill vegetative cover and storm water drainage systems continue to provide adequate protection to maintain the integrity of the landfill, and LUCs are being properly implemented to prevent uncontrolled exposure to contaminated soil, solidified sludge, and groundwater.

6.6 INTERVIEWS

The NPL site is centrally located on Robins AFB, and the site boundaries do not extend onto public property. Because of the restricted access to the Base and LUCs restricting access to the NPL site, public involvement with the area is non-existent. Therefore, interviews with private citizens and public officials were not necessary for this five-year review.

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TABLES

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Table No. 6-1
List of Documents Reviewed as Part of Second Five-Year Review Process

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Document Name	Prepared By	Month / Year
Operation and Maintenance Manual for Solid Waste Management Unit (SWMU) 20/OT20 Interim Measures, SWMU 4/LF04 OU3 Interim Record of Decision, SWMU 3, 6, and 13/LF03, FT06 and WP13 Corrective Action Plan, SWMU 17 and 24/OT17 Corrective Action Plan, and Groundwater Treatment System	Earth Tech, Inc.	September 2002
Semi-Annual Progress Report, December 2000 – May 2001; SWMU 20/OT20 Interim Measures; SWMU 4/LF04 OU3 Interim Record of Decision; SWMU 3, 6 and 13/LF03 Corrective Action Plan; SWMU 17 and 24/OT17 Corrective Action Plan; and Groundwater Treatment System	Earth Tech, Inc.	October 2001
Semi-Annual Progress Report, June 2001 – November 2001; SWMU 20/OT20 Interim Measures; SWMU 4/LF04 OU3 Interim Record of Decision; SWMU 3, 6 and 13/LF03 Corrective Action Plan; SWMU 17 and 24/OT17 Corrective Action Plan; and Groundwater Treatment System	Earth Tech, Inc.	February 2002
Annual Progress Report, December 2001 – November 2002 for SWMU 4/LF04 OU3 Interim Record of Decision; SWMU 20/OT20 Corrective Action Plan; SWMUs 3, 6 and 13/LF03 Corrective Action Plan; SWMUs 17 and 24/OT17 Corrective Action Plan; SWMU 62/OT37 Corrective Action Plan; SWMUs 57 and 61/OT41 Corrective Action Plan; and Groundwater Treatment System	Earth Tech, Inc.	March 2003
Annual Progress Report, December 2002 – November 2003 for SWMU 4/LF04 OU3 Interim Record of Decision; SWMU 20/OT20 Corrective Action Plan; SWMUs 3, 6, and 13/LF03 Corrective Action Plan; SWMUs 17 and 24/OT17 Corrective Action Plan; SWMU 62/OT37 Corrective Action Plan; SWMUs 57 and 61/OT41 Corrective Action Plan; and Groundwater Treatment System	Earth Tech, Inc.	March 2004
Annual Progress Report, December 2003 – November 2004 for SWMU 4/LF04 OU3 Interim Record of Decision; SWMU 20/OT20 Corrective Action Plan; SWMUs 3, 6, and 13/LF03 Corrective Action Plan; SWMUs 17 and 24/OT37 Corrective Action Plan; SWMU 62/OT37 Corrective Action Plan; SWMUs 57 and 61/OT41 Corrective Action Plan; and Groundwater Treatment System	GeoSyntec Consultants	April 2005
Annual Progress Report, December 2004 – November 2005 for SWMU 4/LF04 OU3 Record of Decision; SWMU 20/OT20 Corrective Action Plan; SWMUs 3, 6, and 13/LF03 Corrective Action Plan; SWMUs 17 and 24/OT37 Corrective Action Plan; SWMU 62/OT37 Corrective Action Plan; SWMUs 57 and 61/OT41 Corrective Action Plan; and Groundwater Treatment System	GeoSyntec Consultants	March 2006
Operation and Maintenance Annual Report for Landfill No. 4, Robins Air Force Base (AFB), Year 2001	Earth Tech, Inc.	May 2002
Operation and Maintenance Annual Report for Landfill No. 4, Robins Air Force Base (AFB), Year 2002	Earth Tech, Inc.	May 2003
Operation and Maintenance Annual Report for Landfill No. 4, Robins Air Force Base (AFB), Year 2003	Earth Tech, Inc.	May 2004

Table No. 6-1
List of Documents Reviewed as Part of Second Five-Year Review Process

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Document Name	Prepared By	Month / Year
Operation and Maintenance Annual Report for Landfill No. 4, Robins Air Force Base (AFB), Year 2004	GeoSyntec Consultants	May 2005
Operation and Maintenance Annual Report for Landfill No. 4, Robins Air Force Base (AFB), Year 2005	GeoSyntec Consultants	In Review, Due June 2006
Final Remedial Investigation Report, Zone 1	CH2MHill	May 1990
Interim Record of Decision, Robins AFB, Zone 1, Georgia, Operable Unit 1 Source Control	Robins AFB	June 1991
Final Remedial Investigation Report, Zone 1, Operable Unit 3: Groundwater	CH2MHill	April 1993
Interim Record of Decision, Robins AFB Zone 1, Georgia, Operable Unit 3, Groundwater	Oak Ridge National Laboratory	August 1995
Feasibility Study Report, Zone 1, Operable Units 1 and 3	Earth Tech/Rust Environmental & Infrastructure	August 1999
First Five-Year Review Report for NPL Site, Robins AFB, Houston County, Georgia.	Robins AFB	March 2001
Final Record of Decision (ROD) for the National Priorities List (NPL) Site, Operable Units (OUs) 1 and 3	Earth Tech, Inc.	September 2004

Table No. 6-2
Average Methane Concentrations Measured at Landfill Gas Vents

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Area Designation[2]	Average Methane Concentrations[1] (percent by volume)					
	2001	2002	2003	2004	2005	**2001 to 2005**
Area 1	11.9	12.4	18.4	12.8	14.7	**14.0**
Area 2	11.1	16.1	24.1	19.7	19.6	**18.1**
Area 3	12.5	14.0	27.1	21.2	23.0	**19.6**
Overall Site	11.8	14.2	23.2	17.9	19.1	**17.3**
	Annual Rainfall (inches)					
	41.5	46.8	56.5	45.3	46.5	**47.3**

Notes:

[1] - Average methane concentrations represent an average of measured readings from all the gas vents within the area and not a weighted average, since no gas volumes per unit time were measured.

[2] - Area Designations are shown on Figure 3-5B.

Table No. 6-3
Historical Annual Average Flow Rates for NPL Site Recovery Wells

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Reporting Period	RW1[2]			RW2[3]			RW3[3]		
	Total Flow	Average Flow[1]		Total Flow	Average Flow[1]		Total Flow	Average Flow[1]	
	(gal)	(gpd)	(gpm)	(gal)	(gpd)	(gpm)	(gal)	(gpd)	(gpm)
December 2004 - November 2005	3,842,203	39,206	27.2	--	--	--	--	--	--
December 2003 - November 2004	--	--	--	--	--	--	--	--	--
December 2002 - November 2003	--	--	--	--	--	--	--	--	--
December 2001 - November 2002	--	--	--	4,432,142	26,700	18.5	5,781,913	34,831	24.2
December 2000 - November 2001	--	--	--	9,175,057	25,137	17.5	13,239,577	36,273	25.2
December 1999 - November 2000	--	--	--	9,640,637	26,341	18.3	13,402,874	36,620	25.4
December 1998 - November 1999	1,671,814	22,902	15.9	9,332,193	25,568	17.8	15,415,229	42,234	29.3
October 1997 - November 1998	8,991,794	21,107	14.7	9,109,819	21,385	14.9	16,918,510	39,715	27.6

Reporting Period	RW4			RW5			RW6[3]		
	Total Flow	Average Flow[1]		Total Flow	Average Flow[1]		Total Flow	Average Flow[1]	
	(gal)	(gpd)	(gpm)	(gal)	(gpd)	(gpm)	(gal)	(gpd)	(gpm)
December 2004 - November 2005	24,173,115	66,228	46.0	20,592,768	56,419	39.2	--	--	--
December 2003 - November 2004	27,433,472	74,955	52.1	18,670,862	51,013	35.4	--	--	--
December 2002 - November 2003	27,822,552	76,226	52.9	24,418,905	66,901	46.5	--	--	--
December 2001 - November 2002	15,900,186	43,562	30.3	18,555,348	50,837	35.3	5,733,209	34,537	24.0
December 2000 - November 2001	14,119,760	38,684	26.9	11,132,467	30,500	21.2	12,960,375	35,508	24.7
December 1999 - November 2000	13,686,912	37,396	26.0	12,087,731	33,027	22.9	12,447,138	34,009	23.6
December 1998 - November 1999	18,330,058	50,219	34.9	13,881,084	38,030	26.4	14,213,970	38,942	27.0
October 1997 - November 1998	16,874,663	39,612	27.5	12,225,317	28,698	19.9	12,561,854	29,488	20.5

Reporting Period	All Wells		
	Total Flow	Average Flow[1]	
	(gal)	(gpd)	(gpm)
December 2004 - November 2005	48,608,086	133,173	92.5
December 2003 - November 2004	46,104,333	125,968	87.5
December 2002 - November 2003	52,241,457	143,127	99.4
December 2001 - November 2002	50,402,798	138,090	95.9
December 2000 - November 2001	60,627,236	166,102	115.3
December 1999 - November 2000	61,265,292	167,392	116.2
December 1998 - November 1999	72,844,348	199,574	138.6
October 1997 - November 1998	76,681,957	180,005	125.0

Notes:

1. Yearly average flow rates in gpd and gpm are calculated based on the operational period of the well. However, the calculation does not account for periods of temporary shutdowns.
2. RW1 began operating in October 1997 and was shut down on 11 February 1999 with regulatory approval. However, RW1 was temporarily reactivated from 24 February 2005 to 1 June 2005.
3. RW2, RW3, and RW6 began operating in October 1997 and were shut down on 14 May 2002 with regulatory approval.
4. The toe drain pumps began operating in October 1997 and were shut down on 14 May 2002 with regulatory approval. The flow data are not presented.
5. gal - gallons.
   gpm - gallons per minute.
   gpd - gallons per day.
   -- Pump not operational in the given period of time.

Table No. 6-4
NPL Site Well Construction Details and Groundwater Elevation Data (2005)

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Well ID	Northing (ft)	Easting (ft)	Ground Surface Elevation (ft MSL)	TOC Elevation (ft MSL)	Total Depth of Well (ft BGS)	Well Bottom Elevation (ft MSL)	Hydrogeologic Unit	Screen Interval (ft BGS)	Screen Interval (ft MSL)	DTW[1] (ft BTOC)	Water Level Elevation[1] (ft MSL)	Notes
LF4-5	953841.30	2476801.34	253.9	256.40	50.0	203.9	UPROV	35.0-50.0	218.9 - 203.9	5.87	250.53	a
LF4-6	953853.60	2476795.53	253.8	255.89	25.0	228.8	QUAT	15.0-25.0	238.8 - 228.8	5.41	250.48	a
LF4-7	953331.39	2477701.32	249.0	251.64	100.0	149.0	LPROV	85.0-100.0	164.0 - 149.0	2.71	248.93	a
LF4-8	953329.59	2477695.52	249.3	254.50	65.0	184.3	UPROV	50.0-65.0	199.3 - 184.3	5.79	248.71	a
LF4-10	953088.67	2477754.36	250.2	254.20	100.0	150.2	LPROV	85.0-100.0	165.2 - 150.2	4.71	249.49	a
LF4-11	953080.72	2477755.53	250.7	254.75	65.0	185.7	UPROV	50.0-65.0	200.7 - 185.7	6.00	248.75	a
LF4-14	953459.02	2475462.34	292.9	293.91	51.0	241.9	UPROV	41.0-51.0	251.9 - 241.9	37.43	256.48	a
LF4-16	952787.17	2479123.41	248.3	249.78	21.0	227.3	QUAT	11.0-21.0	237.3 - 227.3	4.62	245.16	a
LF4-17	953511.48	2478888.12	248.9	250.62	23.0	225.9	QUAT	13.0-23.0	235.9 - 225.9	5.21	245.41	a
LF4-18	953918.78	2478832.02	248.5	250.20	18.0	230.5	QUAT	8.0-18.0	240.5 - 230.5	4.92	245.28	a
LF4-19	953242.88	2479013.51	249.0	248.67	25.0	224.0	QUAT	15.0-25.0	234.0 - 224.0	3.37	245.30	a
LF4-20	953756.98	2476835.40	253.1	256.40	8.0	245.1	SURF	3.0-8.0	250.1 - 245.1	5.20	251.20	a
LF4-23	953671.81	2476953.29	255.1	259.04	27.5	227.6	QUAT	17.5-27.5	237.6 - 227.6	8.48	250.56	a
LF4-27	953399.69	2477511.62	253.4	261.94	31.0	222.4	QUAT	21.0-31.0	232.4 - 222.4	12.93	249.01	a
LF4-28	953321.79	2477685.02	251.2	256.73	8.0	243.2	SURF	3.0-8.0	248.2 - 243.2	6.11	250.62	a
LF4-29	953066.75	2477743.47	251.3	255.41	8.0	243.3	SURF	3.0-8.0	248.3 - 243.3	4.64	250.77	a
LF4-30	952593.61	2477324.92	254.0	256.37	28.5	225.5	QUAT	18.5-28.5	235.5 - 225.5	5.90	250.47	a
LF4-34	952789.77	2479117.31	249.3	250.67	58.0	191.3	UPROV	48.0-58.0	201.3 - 191.3	6.67	244.00	a
LF4-35	952794.47	2479116.71	249.2	250.85	98.0	151.2	LPROV	88.0-98.0	161.2 - 151.2	5.00	245.85	a
LF4-36	953510.78	2478881.72	248.6	249.53	60.0	188.6	UPROV	50.0-60.0	198.6 - 188.6	4.11	245.42	a
LF4-37	953506.08	2478893.92	248.6	249.44	98.0	150.6	LPROV	88.0-98.0	160.6 - 150.6	1.95	247.49	a
LF4-38	953923.38	2478831.32	248.5	250.53	58.0	190.5	UPROV	48.0-58.0	200.5 - 190.5	5.00	245.53	a
LF4-39	953928.48	2478830.42	248.7	249.96	99.0	149.7	LPROV	89.0-99.0	159.7 - 149.7	2.15	247.81	a
LF4-40	952587.81	2477322.81	253.6	256.24	57.0	196.6	UPROV	47.0-57.0	206.6 - 196.6	5.82	250.42	a
LF4-41	952582.92	2477320.84	253.5	256.11	96.0	157.5	LPROV	86.0-96.0	167.5 - 157.5	5.26	250.85	a
LF4-42	953567.15	2477139.90	254.6	258.80	57.0	197.6	UPROV	47.0-57.0	207.6 - 197.6	9.39	249.41	a
LF4-43	953564.00	2477144.57	255.1	258.73	97.0	158.1	LPROV	87.0-97.0	168.1 - 158.1	8.75	249.98	a
LF4-44	953854.90	2476790.23	253.8	255.34	8.5	245.3	SURF	3.5-8.5	250.3 - 245.3	4.45	250.89	a
LF4-45	953857.71	2476774.55	254.1	256.00	98.0	156.1	LPROV	88.0-98.0	166.1 - 156.1	4.46	251.54	a
LF4-46	952750.48	2476575.39	262.4	267.22	26.0	236.4	UPROV	21.0-26.0	241.4 - 236.4	15.03	252.19	a
LF4-47	953292.47	2476725.87	259.7	267.37	27.5	232.2	UPROV	22.5-27.5	237.2 - 232.2	16.10	251.27	a
LF4-48	953280.05	2476117.26	263.6	271.11	25.0	238.6	UPROV	20.0-25.0	243.6 - 238.6	16.06	255.05	a
LF4BL1	952701.62	2474944.44	299.5	302.23	217.0	82.5	BLUFF	207.0-217.0	92.5 - 82.5	43.65	258.58	a
LF4BL2	952217.41	2475826.73	290.7	293.48	216.0	74.7	BLUFF	206.0-216.0	84.7 - 74.7	37.06	256.42	a
LF4BL3	952568.09	2477314.36	253.5	257.88	181.0	72.5	BLUFF	171.0-181.0	82.5 - 72.5	4.00	253.88	a
LF4BL4CU	952990.40	2477707.09	256.2	258.92	160.0	96.2	CUSSETA	150.0-160.0	106.2 - 96.2	8.89	250.03	a
LF4BL5	953593.55	2477093.08	255.0	258.76	176.0	79.0	BLUFF	166.0-176.0	89.0 - 79.0	5.30	253.46	a
LF4BL6	953902.27	2476684.14	254.2	256.04	150.0	104.2	BLUFF	140.0-150.0	114.2 - 104.2	2.41	253.63	a
LF4BL7	952794.21	2479148.06	248.2	252.73	182.0	66.2	BLUFF	172.0-182.0	76.2 - 66.2	1.60	251.13	a
LF4BL8	953935.17	2478776.25	250.1	252.11	178.0	72.1	BLUFF	168.0-178.0	82.1 - 72.1	1.00	251.11	a

Table No. 6-4
NPL Site Well Construction Details and Groundwater Elevation Data (2005)

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Well ID	Northing (ft)	Easting (ft)	Ground Surface Elevation (ft MSL)	TOC Elevation (ft MSL)	Total Depth of Well (ft BGS)	Well Bottom Elevation (ft MSL)	Hydrogeologic Unit	Screen Interval (ft BGS)	Screen Interval (ft MSL)	DTW[1] (ft BTOC)	Water Level Elevation[1] (ft MSL)	Notes
LF4PR1	952689.82	2474930.94	299.5	301.98	140.0	159.5	LPROV	130.0-140.0	169.5 - 159.5	43.02	258.96	a
LF4PR2	952201.81	2475828.43	290.9	293.45	135.0	155.9	LPROV	125.0-135.0	165.9 - 155.9	37.50	255.95	a
LF4PR3	952701.72	2474931.24	299.4	301.72	70.0	229.4	UPROV	60.0-70.0	239.4 - 229.4	42.63	259.09	a
LF4PR4	952197.91	2475817.83	291.7	294.41	70.0	221.7	UPROV	60.0-70.0	231.7 - 221.7	37.82	256.59	a
LF4WP1	953840.70	2476928.53	248.8	252.22	7.1	241.7	PC	4.6-7.1	244.2 - 241.7	2.74	249.48	a
LF4WP2	953949.59	2478323.35	246.8	247.46	4.5	242.3	PC	2.0-4.5	244.8 - 242.3	2.00	245.46	a
LF4WP7	953432.69	2477873.52	247.8	249.24	13.6	234.2	QUAT	11.1-13.6	236.7 - 234.2	1.38	247.86	a
LF4WP8	953874.70	2477093.53	250.5	250.83	17.2	233.3	QUAT	12.2-17.2	238.3 - 233.3	1.62	249.21	a
LF4WP9	953647.70	2477413.53	247.9	248.86	14.1	233.8	QUAT	9.1-14.1	238.8 - 233.8	0.00	248.86	a
LF4WP10	953551.69	2478038.52	246.8	247.47	16.7	230.1	QUAT	11.7-16.7	235.1 - 230.1	2.48	244.99	a
LF4WP11	953294.69	2478056.52	247.5	248.46	16.4	231.1	QUAT	11.4-16.4	236.1 - 231.1	0.00	248.46	a
LF4WP12	952894.69	2477985.52	247.5	250.53	17.0	230.5	QUAT	12.0-17.0	235.5 - 230.5	2.20	248.33	a
LSB5	953717.51	2476354.13	259.8	263.66	16.0	243.8	SURF	6.0-16.0	253.8 - 243.8	9.63	254.03	a
LSB11	953200.71	2476262.33	263.8	271.19	16.5	247.3	SURF	6.5-16.5	257.3 - 247.3	13.04	258.15	a
LSB13	953134.51	2476565.33	260.6	268.68	17.0	243.6	SURF	7.0-17.0	253.6 - 243.6	17.31	251.37	a
LSB14	952841.19	2477419.52	258.7	263.23	17.0	241.7	SURF	7.0-17.0	251.7 - 241.7	10.41	252.82	a
LSB15	953250.99	2477476.12	256.8	262.56	17.0	239.8	SURF	7.0-17.0	249.8 - 239.8	10.38	252.18	a
RI1-1W	952991.81	2475897.04	272.2	273.66	100.0	172.2	LPROV	90.0-100.0	182.2 - 172.2	18.31	255.35	a
RI1-2W	952961.91	2475895.43	273.3	275.14	50.0	223.3	UPROV	40.0-50.0	233.3 - 223.3	19.45	255.69	a
RI1-3W	952619.21	2476033.63	276.3	277.75	100.0	176.3	LPROV	90.0-100.0	186.3 - 176.3	22.65	255.10	a
RI1-4W	952610.31	2476044.63	276.0	278.27	50.0	226.0	UPROV	40.0-50.0	236.0 - 226.0	22.69	255.58	a
RI1-6W	953055.31	2475985.63	265.4	265.88	24.1	241.3	UPROV	14.1-23.7	251.3 - 241.7	10.56	255.32	a
RI1-7W	952868.61	2476146.13	269.6	273.24	36.2	233.4	UPROV	26.2-35.8	243.4 - 233.8	18.09	255.15	a
RW1	953882.21	2476679.53	253.8	255.95	37.5	216.3	QUAT	22.5-32.5	231.3 - 221.3	N/R	N/R	--
RW2	953738.90	2476844.42	254.0	256.44	34.9	219.2	QUAT	19.9-29.9	234.1 - 224.1	N/R	N/R	--
RW3	953078.56	2477746.91	251.6	255.34	27.8	223.8	QUAT	17.8-22.8	233.8 - 228.8	N/R	N/R	--
RW4	953327.61	2477672.89	254.3	256.85	32.5	221.8	QUAT	22.5-27.5	231.8 - 226.8	N/R	N/R	--
RW5	953669.77	2477104.33	252.0	255.87	28.0	224.0	QUAT	16.0-26.0	236.0 - 226.0	N/R	N/R	--
RW6	953564.13	2477274.89	253.0	256.13	32.0	221.0	QUAT	20.0-30.0	233.0 - 223.0	N/R	N/R	--

Notes:
"TOC" - Top of Casing.
"DTW" - Depth to Water.
"ft MSL" - Feet from Mean Sea Level.
"ft BGS" - Feet Below Ground Surface.
"ft BTOC" - Feet Below Top of Casing.
"N/R" - Not reported.
[1] Water level measurements were obtained under regular operating conditions (i.e., the groundwater recovery system was in operation).
a - Water levels recorded in Spring 2005 (4/26-4/27/2005).

Table No. 6-5
Summary of Analytical Results for NPL Site Groundwater Recovery Wells (2005)

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Location ID Sample Date Hydrogeologic Unit Screen Sample Type	RL/MCL[1]	RW1[2] 4/28/2005 QUAT 22.5 - 32.5 NORM	RW4 2/3/2005 QUAT 22.5 - 27.5 NORM	RW4 4/28/2005 QUAT 22.5 - 27.5 NORM	RW5 2/3/2005 QUAT 16 - 26 NORM	RW5 4/28/2005 QUAT 16 - 26 NORM
Volatile Organics (µg/L)						
1,1-dichloroethane		1.0 U	5.0 U	2.0 U	5.0 U	**0.10 J**
1,2-dichlorobenzene	600	1.0 U	5.0 U	**0.52 J**	5.0 U	0.50 U
1,2-dichloroethane	5	**0.46 J**	5.0 U	2.0 U	5.0 U	0.5 U
acetone		**16**	25.0 U	40.0 U	25.0 U	7.7 U
carbon disulfide		1.0 U	5.0 U	**12.0**	5.0 U	0.50 U
carbon tetrachloride	5	**2.1**	**7.5**	**5.9**	5.0 U	**3.4**
chlorobenzene	100	1.0 U	5.0 U	2.0 U	5.0 U	**0.32 J**
chloroform	80	**1.1**	5.0 U	**1.9 J**	5.0 U	**0.95**
cis-1,2-dichloroethene	70	**1.5**	**9.1**	**12.0**	5.0 U	**1.9**
tetrachloroethene (PCE)	5	**1.1**	**27.6**	**18.0**	5.0 U	**1.9**
trichloroethene	5	**20**	**71.9**	**59.0**	**10.2**	**9.1**
vinyl chloride	2	**4.7**	5.0 U	2.0 U	5.0 U	**0.72**

Notes:

Data qualifiers:

"J" - estimated concentration.

"U" - not detected (reported at detection limit).

-- µg/L - micrograms per liter.

-- Screened intervals are given in feet below ground surface.

-- Bolded values indicate detections.

-- Shaded areas indicate concentrations exceeding the RL/MCL.

-- RW1, RW2, RW3, and RW6 are posted to Table 6-6 since they are used for monitoring purposes only.

[1] - If not otherwise specified, RLs (Remedial Levels) are equal to MCLs (Maximum Contaminant Levels) for Drinking Water (Drinking Water Regulations and Health Advisories, July 2002).

[2] - RW1 began operating in October 1997 and was shut down on 11 February 1999 with regulatory approval. However, RW1 was temporarily reactivated from 24 February 2005 to 1 June 2005.

Sample type:

NORM - Normal.

Hydrogeologic Units:

QUAT - Quaternary Alluvium.

Table No. 6-6
Summary of Analytical Results for NPL Site Groundwater Monitoring Wells (2005)

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Location ID		LF4-5	LF4-6	LF4-7	LF4-8	LF4-10	LF4-11	LF4-14	LF4-16	LF4-17	LF4-18	LF4-19	LF4-20	LF4-23	LF4-27	LF4-28	LF4-29	LF4-30
Sample Date		4/27/2005	4/27/2005	4/27/2005	4/28/2005	4/27/2005	4/27/2005	5/1/2005	4/28/2005	4/28/2005	4/28/2005	4/28/2005	4/27/2005	4/27/2005	4/28/2005	4/28/2005	4/28/2005	4/29/2005
Hydrogeologic Unit		UPROV	QUAT	LPROV	UPROV	LPROV	UPROV	UPROV	QUAT	QUAT	QUAT	QUAT	SURF	QUAT	QUAT	SURF	SURF	QUAT
Screen		35 - 50	15 - 25	85 - 100	50 - 65	85 - 100	50 - 65	41 - 51	11 - 21	13 - 23	8 - 18	15 - 25	3 - 8	17.5 - 27.5	21 - 31	3 - 8	3 - 8	18.5 - 28.5
Sample Type	RL/MCL[1]	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
Volatile Organics (µg/L)																		
1,1,2-trichlorotrifluoroethane		0.50 U	40.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1-dichloroethane		0.50 U	40.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1-dichloroethene	7	0.50 U	40.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-dichlorobenzene	600	0.50 U	**880**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.13 J**	**0.18 J**	0.50 U
1,2-dichloroethane	5	**0.88**	40.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.16 J**	0.50 U	0.50 U	0.50 U
1,3-dichlorobenzene		0.50 U	40.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,4-dichlorobenzene	75	0.50 U	**580**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.78**	**0.93**	0.50 U
acetone		5.0 U	400 U	5.0 U	7.3 U	5.0 U	5.0 U	5.0 U	6.7 U	9.0 U	8.1 U	6.3 U	5.0 U	5.0 U	7.6 U	**3.1 J**	5.0 U	11.0 U
benzene	5	0.50 U	**89.0**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
carbon disulfide		0.50 U	40.0 U	0.50 U	0.50 U	**0.33 J**	**0.75 J**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
carbon tetrachloride	5	0.50 U	40.0 U	0.50 U	0.50 U	0.50 U	**0.68**	**0.64**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**3.7**	**5.4**	0.50 U	0.50 U	**46.0**
chlorobenzene	100	0.50 U	**1,700**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**1.3**	**0.28 J**	0.50 U	**3.4**	**8.9**	0.50 U
chloroform	80	0.50 U	40.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.83**	**1.5**	0.50 U	0.50 U	**6.4**
chloromethane		0.50 U	40.0 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.52**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,2-dichloroethene	70	0.50 U	**390 J**	0.50 UJ	0.50 U	0.50 U	**0.11 J**	0.50 U	0.50 U	0.50 U	**0.48 J**	0.50 U	0.50 UJ	**1.0**	**2.2**	0.50 U	0.50 UJ	0.50 U
cis-1,3-dichloropropene		0.50 U	40.0 U	0.50 UJ	**0.13 J**	0.50 UJ	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
ethylbenzene	700	0.50 U	**12.0 J**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
isopropylbenzene		0.50 U	40.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 UJ	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.57**	0.50 U
tetrachloroethene (PCE)	5	**0.51**	40.0 U	0.50 U	0.50 U	0.50 U	**2.3**	**0.43 J**	0.50 U	0.50 U	**0.31 J**	0.50 U	0.50 U	**1.0**	**25.0**	0.50 U	0.50 U	**0.56**
toluene	1,000	0.50 U	**65.0**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.20 J**	0.50 U	0.50 U	**0.20 J**	**0.15 J**	0.50 U
trans-1,2-dichloroethene	100	0.50 U	**3.5 J**	0.50 UJ	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 UJ	0.50 U	0.50 U	0.50 U	0.50 UJ	0.50 U
trichloroethene	5	**0.49 J**	40.0 U	0.50 U	0.50 U	0.50 U	**3.6**	**2.1**	**0.34 J**	**0.37 J**	**0.50 J**	**0.81**	0.50 U	**4.2**	**36.0**	0.50 U	0.50 U	**2.7**
trichlorofluoromethane		N/A	N/A	0.50 U	N/A	0.50 U	0.50 U	**0.17 J**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
vinyl chloride	2	0.50 U	40.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
xylenes	10,000	0.50 U	**39.0 J**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.15 J**	**0.21 J**	0.50 U
Inorganics (µg/L)																		
aluminum		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**58.4 J**	N/A	N/A	**59.6 J**	55.3 U	N/A
antimony	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**21.3 J**	N/A	N/A	**20.6 J**	**22.1 J**	N/A
arsenic	10[b]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**34.6 J**	N/A	N/A	**111 J**	**22.2 J**	N/A
barium	2,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**572**	N/A	N/A	**383**	**512**	N/A
cadmium	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.30 U	N/A	N/A	0.30 U	0.30 U	N/A
calcium		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**42,900**	N/A	N/A	**139,000**	**142,000**	N/A
chromium	100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.5 U	N/A	N/A	**7.2 J**	**3.8 J**	N/A
cobalt		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.60 U	N/A	N/A	0.60 U	**0.92 J**	N/A
copper	1,300[a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**6.0 J**	N/A	N/A	**4.4 J**	**4.7 J**	N/A
cyanide	200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.60 U	N/A	N/A	**0.70 J**	**0.60 J**	N/A
iron		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**89,300**	N/A	N/A	**83,400**	**85,700**	N/A
lead	15[a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**2.4 J**	N/A	N/A	2.4 U	2.4 U	N/A
magnesium		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**3890 J**	N/A	N/A	**12,100**	**13,100**	N/A
manganese		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**836**	N/A	N/A	**431**	**351**	N/A
mercury	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.10 UJ	N/A	N/A	0.10 UJ	0.10 UJ	N/A
nickel[c]		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.1 U	N/A	N/A	**2.3 J**	**6.2 J**	N/A
potassium		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**4450 J**	N/A	N/A	**16,400**	**18,700**	N/A
sodium		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**27,500**	N/A	N/A	**29,400**	**51,300**	N/A
vanadium		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.1 U	N/A	N/A	1.1 U	1.1 U	N/A
zinc		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.70 U	N/A	N/A	0.70 U	0.70 U	N/A

Notes:
Data qualifiers:
"J" - estimated concentration.
"U" - not detected (reported at detection limit).
"UJ" - not detected (estimated detection limit).
-- µg/L - micrograms per liter.
-- N/A indicates parameter not analyzed and/or value not available.
-- Bolded values indicate detections.
-- Shaded areas indicate concentrations exceeding the RL/MCL.
-- Screened intervals are given in feet below ground surface.
[a] - Lead action level is 15 µg/l (TT) and copper action level is 1300 µg/l (The values are based on Record of Decision for the NPL Site, OU1 and OU3, 2000, Table 2).
[b] - The new MCL for Arsenic (10 ppb) is used in this report. It was adopted by EPA on 22 January 2001 and will go in effect beginning 23 January 2006.
[c] - Former US EPA MCL for nickel was 100 µg/L. The MCL was "remanded" on 9 February 1995.
[1] - If not otherwise specified, RLs (Remedial Levels) are equal to MCLs (Maximum Contaminant Levels) for Drinking Water (Drinking Water Regulations and Health Advisories, July 2002).
[2] - RW1, RW2, RW3, and RW6 are included in this table since they were used in this period for monitoring purposes only. However, RW1 was used as an for extraction well for a short period of time (02/24/2005 - 06/01/2005).

Hydrogeologic Units:
LPROV - Lower Providence.
UPROV - Upper Providence.
PC - Peat/Clay.
BLUFF - Blufftown.
QUAT - Quaternary Alluvium.
SURF - Surficial.
CUSSETA - Cusetta.

Sample type:
NORM - Normal.

Table No. 6-6

Summary of Analytical Results for NPL Site Groundwater Monitoring Wells (2005)

Second Five-Year Review Report for the NPL Site, OU1 and OU3

Robins Air Force Base, Georgia

Location ID		LF4-34	LF4-35	LF4-36	LF4-37	LF4-38	LF4-39	LF4-40	LF4-41	LF4-42	LF4-43	LF4-44	LF4-45	LF4-46	LF4-47	LF4-48	LF4BL1	LF4BL2
Sample Date		4/29/2005	4/29/2005	4/29/2005	4/29/2005	4/29/2005	4/29/2005	4/29/2005	4/29/2005	4/28/2005	4/27/2005	4/27/2005	4/27/2005	4/29/2005	4/29/2005	4/29/2005	5/1/2005	4/30/2005
Hydrogeologic Unit		UPROV	LPROV	UPROV	LPROV	UPROV	LPROV	UPROV	LPROV	UPROV	LPROV	SURF	LPROV	UPROV	UPROV	UPROV	BLUFF	BLUFF
Screen		48 - 58	88 - 98	50 - 60	88 - 98	48 - 58	89 - 99	47 - 57	86 - 96	47 - 57	87 - 97	3.5 - 8.5	88 - 98	21 - 26	22.5 - 27.5	20 - 25	207 - 217	206 - 216
Sample Type	RL/MCL[1]	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
Volatile Organics (µg/L)																		
1,1,2-trichlorotrifluoroethane		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1-dichloroethane		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	**0.16 J**	0.50 U	0.50 U	0.50 U	0.50 U
1,1-dichloroethene	7	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-dichlorobenzene	600	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**3.1**	0.50 U	**0.68**	0.50 U	0.50 U	0.50 U	0.50 U
1,2-dichloroethane	5	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	**1.1**	0.50 U	0.50 U	0.50 U	0.50 U
1,3-dichlorobenzene		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**1.6**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,4-dichlorobenzene	75	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**3.7**	0.50 U	**1.9**	0.50 U	0.50 U	0.50 U	0.50 U
acetone		8.9 U	9.3 U	17.0 U	9.2 U	8.8 U	7.1 U	14.0 U	8.4 U	8.0 U	5.0 U	10.0 U	5.0 U	23.0 U	18.0 U	9.0 U	5.0 U	22.0 U
benzene	5	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**4.1**	0.50 U	**16.0**	0.50 U	**0.35 J**	0.50 U	0.50 U
carbon disulfide		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
carbon tetrachloride	5	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	**7.1**	0.50 U	0.50 U	0.50 U
chlorobenzene	100	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**37.0**	0.50 U	**13.0**	**0.095 J**	**1.4**	0.50 U	0.50 U
chloroform	80	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.15 J**	0.50 U	1.0 U	0.50 U	0.50 U	**2.1**	0.50 U	0.50 U	0.50 U
chloromethane		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,2-dichloroethene	70	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.25 J**	0.50 UJ	**0.91**	**0.45 J**	**0.47 J**	0.50 UJ	0.50 U
cis-1,3-dichloropropene		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.14 J**	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
ethylbenzene	700	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
isopropylbenzene		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 UJ	0.50 U	0.50 U	0.50 U	0.50 U	**0.18 J**	0.50 U	0.50 U	0.50 UJ	0.50 UJ	0.50 U	0.50 U
tetrachloroethene (PCE)	5	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.19 J**	0.50 U	1.0 U	**0.57**	0.50 U	**12.0**	0.50 U	0.50 U	0.50 U
toluene	1,000	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.29 J**	0.50 U	0.50 U	**0.041 J**	**0.11 J**	0.50 U	0.50 U
trans-1,2-dichloroethene	100	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 UJ	0.50 U	0.50 U	0.50 U	0.50 UJ	0.50 U
trichloroethene	5	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.33 J**	**0.15 J**	**0.34 J**	**0.17 J**	1.0 U	0.50 U	0.50 U	**12.0**	**0.17 J**	0.50 U	0.50 U
trichlorofluoromethane		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
vinyl chloride	2	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	**1.7**	0.50 U	0.50 U	0.50 U	0.50 U
xylenes	10,000	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.33 J**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Inorganics (µg/L)																		
aluminum		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	55.3 U	N/A	N/A	N/A	N/A	N/A	N/A
antimony	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**13.4 J**	N/A	N/A	N/A	N/A	N/A	N/A
arsenic	10 [b]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**6.2 J**	N/A	N/A	N/A	N/A	N/A	N/A
barium	2,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**287**	N/A	N/A	N/A	N/A	N/A	N/A
cadmium	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.30 U	N/A	N/A	N/A	N/A	N/A	N/A
calcium		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**59,000**	N/A	N/A	N/A	N/A	N/A	N/A
chromium	100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**2.7 J**	N/A	N/A	N/A	N/A	N/A	N/A
cobalt		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.60 U	N/A	N/A	N/A	N/A	N/A	N/A
copper	1,300 [a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**2.1 J**	N/A	N/A	N/A	N/A	N/A	N/A
cyanide	200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.60 U	N/A	N/A	N/A	N/A	N/A	N/A
iron		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**45,700**	N/A	N/A	N/A	N/A	N/A	N/A
lead	15 [a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.4 U	N/A	N/A	N/A	N/A	N/A	N/A
magnesium		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**6,550**	N/A	N/A	N/A	N/A	N/A	N/A
manganese		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**1,300**	N/A	N/A	N/A	N/A	N/A	N/A
mercury	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.10 UJ	N/A	N/A	N/A	N/A	N/A	N/A
nickel [c]		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.1 U	N/A	N/A	N/A	N/A	N/A	N/A
potassium		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**6,220**	N/A	N/A	N/A	N/A	N/A	N/A
sodium		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**5,400**	N/A	N/A	N/A	N/A	N/A	N/A
vanadium		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.1 U	N/A	N/A	N/A	N/A	N/A	N/A
zinc		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.70 U	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

Data qualifiers:

"J" - estimated concentration.

"U" - not detected (reported at detection limit).

"UJ" - not detected (estimated detection limit).

-- µg/L - micrograms per liter.

-- N/A indicates parameter not analyzed and/or value not available.

-- Bolded values indicate detections.

-- Shaded areas indicate concentrations exceeding the RL/MCL.

-- Screened intervals are given in feet below ground surface.

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Sample type:

NORM - Normal.

Table No. 6-6
Summary of Analytical Results for NPL Site Groundwater Monitoring Wells (2005)

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Location ID		LF4BL3	LF4BL4CU	LF4BL5	LF4BL6	LF4BL7	LF4BL8	LF4PR1	LF4PR2	LF4PR3	LF4PR4	LF4WP1	LF4WP2	LF4WP7	LF4WP8	LF4WP9	LF4WP10	LF4WP11
Sample Date		5/1/2005	4/29/2005	4/28/2005	4/29/2005	5/2/2005	5/2/2005	5/1/2005	5/1/2005	5/2/2005	5/2/2005	4/27/2005	4/28/2005	4/28/2005	4/28/2005	4/28/2005	4/28/2005	4/27/2005
Hydrogeologic Unit		BLUFF	CUSSETA	BLUFF	BLUFF	BLUFF	BLUFF	LPROV	LPROV	UPROV	UPROV	PC	PC	QUAT	QUAT	QUAT	QUAT	QUAT
Screen		171 - 181	150 - 160	166 - 176	140 - 150	172 - 182	168 - 178	130 - 140	125 - 135	60 - 70	60 - 70	4.6 - 7.1	2.0 - 4.5	11.1 - 13.6	12.2 - 17.2	9.1 - 14.1	11.7 - 16.7	11.4 - 16.4
Sample Type	RL/MCL[1]	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
Volatile Organics (µg/L)																		
1,1,2-trichlorotrifluoroethane		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	20.0 U	0.50 U	1.0 U	1.0 U	2.5 U	0.50 U	0.50 U
1,1-dichloroethane		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	20.0 U	0.50 U	1.0 U	**0.29 J**	2.5 U	0.50 U	0.50 U
1,1-dichloroethene	7	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	20.0 U	0.50 U	1.0 U	**0.46 J**	2.5 U	0.50 U	0.50 U
1,2-dichlorobenzene	600	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**11.0 J**	0.50 U	1.0 U	**0.33 J**	2.5 U	0.50 U	0.50 U
1,2-dichloroethane	5	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	20.0 U	0.50 U	1.0 U	1.0 U	2.5 U	0.50 U	0.50 U
1,3-dichlorobenzene		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	20.0 U	0.50 U	1.0 U	1.0 U	2.5 U	0.50 U	0.50 U
1,4-dichlorobenzene	75	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**19.0 J**	0.50 U	1.0 U	**0.36 J**	2.5 U	0.50 U	0.50 U
acetone		8.8 U	8.7 U	8.1 U	6.4 U	9.7 U	9.7 U	11.0 U	7.9 U	10.0 U	14.0 U	200 U	9.2 U	15.0 U	11.0 U	42.0 U	7.4 U	5.0 U
benzene	5	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**130**	0.50 U	1.0 U	1.0 U	2.5 U	0.50 U	0.50 U
carbon disulfide		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.14 J**	0.50 U	0.50 U	0.50 U	20.0 U	0.50 U	**1.9**	**0.70 J**	**1.8 J**	0.50 U	0.50 U
carbon tetrachloride	5	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**1.9**	20.0 U	0.50 U	**2.2**	**8.0**	**3.7**	0.50 U	**0.38 J**
chlorobenzene	100	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**410**	**0.44 J**	1.0 U	**5.1**	2.5 U	0.50 U	0.50 U
chloroform	80	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**1.9**	20.0 U	0.50 U	1.0 U	**2.9**	**3.2**	0.50 U	0.50 U
chloromethane		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	20.0 U	0.50 U	1.0 U	1.0 U	2.5 U	0.50 U	0.50 U
cis-1,2-dichloroethene	70	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	20.0 UJ	0.50 U	**3.7**	**1.2**	**6.2**	0.50 U	**0.13 J**
cis-1,3-dichloropropene		0.50 U	0.50 U	0.50 U	0.50 UJ	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	20.0 U	0.50 U	1.0 U	1.0 U	2.5 U	0.50 U	0.50 UJ
ethylbenzene	700	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**3.7 J**	0.50 U	1.0 U	1.0 U	2.5 U	0.50 U	0.50 U
isopropylbenzene		*0.50 U*	*0.50 UJ*	*0.50 U*	*0.50 UJ*	*0.50 U*	*0.50 U*	*0.50 U*	*0.50 U*	*0.50 U*	*0.50 U*	*20.0 U*	*0.50 U*	*1.0 U*	*1.0 U*	*2.5 U*	*0.50 U*	*0.50 U*
tetrachloroethene (PCE)	5	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.94**	20.0 U	0.50 U	**3.2**	**3.4**	**17.0**	0.50 U	**0.36 J**
toluene	1,000	0.50 U	**0.045 J**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	20.0 U	0.50 U	1.0 U	1.0 U	2.5 U	0.50 U	0.50 U
trans-1,2-dichloroethene	100	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	20.0 UJ	0.50 U	1.0 U	1.0 U	2.5 U	0.50 U	0.50 UJ
trichloroethene	5	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.27 J**	0.50 U	0.50 U	**9.6**	20.0 U	0.50 U	**22.0**	**27.0**	**36.0**	0.50 U	**1.9**
trichlorofluoromethane		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	20.0 U	0.50 U	1.0 U	1.0 U	2.5 U	0.50 U	0.50 U
vinyl chloride	2	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	20.0 U	0.50 U	1.0 U	1.0 U	2.5 U	0.50 U	0.50 U
xylenes	10,000	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**8.6 J**	0.50 U	1.0 U	1.0 U	2.5 U	0.50 U	0.50 U
Inorganics (µg/L)																		
aluminum		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
antimony	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
arsenic	10 [b]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
barium	2,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
cadmium	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
calcium		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
chromium	100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
cobalt		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
copper	1,300 [a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
cyanide	200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
iron		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
lead	15 [a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
magnesium		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
manganese		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
mercury	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
nickel [c]		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
potassium		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
sodium		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
vanadium		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
zinc		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
Data qualifiers:
"J" - estimated concentration.
"U" - not detected (reported at detection limit).
"UJ" - not detected (estimated detection limit).
-- µg/L - micrograms per liter.
-- N/A indicates parameter not analyzed and/or value not available.
-- Bolded values indicate detections.
-- Shaded areas indicate concentrations exceeding the RL/MCL.
-- Screened intervals are given in feet below ground surface.
[a] - Lead action level is 15 µg/l (TT) and copper action level is 1300 µg/l (The values are based on Record of Decision for the NPL Site, OU1 and OU3, 2000, Table 2).
[b] - The new MCL for Arsenic (10 ppb) is used in this report. It was adopted by EPA on 22 January 2001 and will go in effect beginning 23 January 2006.
[c] - Former US EPA MCL for nickel was 100 µg/L. The MCL was "remanded" on 9 February 1995.
[1] - If not otherwise specified, RLs (Remedial Levels) are equal to MCLs (Maximum Contaminant Levels) for Drinking Water (Drinking Water Regulations and Health Advisories, July 2002).
[2] - RW1, RW2, RW3, and RW6 are included in this table since they were used in this period for monitoring purposes only. However, RW1 was used as an for extraction well for a short period of time (02/24/2005 - 06/01/2005).

Hydrogeologic Units:
LPROV - Lower Providence.
UPROV - Upper Providence.
PC - Peat/Clay.
BLUFF - Blufftown.
QUAT - Quaternary Alluvium.
SURF - Surficial.
CUSSETA - Cusetta.

Sample type:
NORM - Normal.

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Table6-6 AnalyticalSummary-MontrWells.xls

Table No. 6-6
Summary of Analytical Results for NPL Site Groundwater Monitoring Wells (2005)

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Location ID		LF4WP12	LSB5	LSB11	LSB13	LSB14	LSB15	RI1-1W	RI1-2W	RI1-3W	RI1-4W	RI1-6W	RI1-7W	RW1[2]	RW2[2]	RW3[2]	RW6[2]
Sample Date		5/1/2005	4/27/2005	4/27/2005	4/27/2005	4/29/2005	4/28/2005	4/30/2005	4/30/2005	4/30/2005	4/30/2005	4/29/2005	4/29/2005	4/28/2005	4/28/2005	4/28/2005	4/28/2005
Hydrogeologic Unit		QUAT	SURF	SURF	SURF	SURF	SURF	LPROV	UPROV	LPROV	UPROV	UPROV	UPROV	QUAT	QUAT	QUAT	QUAT
Screen		12 - 17	6 - 16	6.5 - 16.5	7 - 17	7 - 17	7 - 17	90 - 100	40 - 50	90 - 100	40 - 50	14.1 - 23.7	26.2 - 35.8	22.5 - 32.5	19.9 - 29.9	17.8 - 22.8	20 - 30
Sample Type	RL/MCL[1]	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
Volatile Organics (µg/L)																	
1,1,2-trichlorotrifluoroethane		0.50 U	5.0 U	2.0 U	5.0 U	5.0 U	0.50 U	**0.32 J**	10.0 U	0.50 U	0.50 U	5.0 U	2.5 U	1.0 U	0.50 U	0.50 U	0.50 U
1,1-dichloroethane		0.50 U	5.0 U	2.0 U	5.0 U	5.0 U	0.50 U	0.50 U	10.0 U	0.50 U	0.50 U	5.0 U	2.5 U	1.0 U	0.50 U	**0.13 J**	0.50 U
1,1-dichloroethene	7	0.50 U	5.0 U	2.0 U	5.0 U	5.0 U	0.50 U	0.50 U	10.0 U	0.50 U	0.50 U	5.0 U	2.5 U	1.0 U	0.50 U	**0.28 J**	0.50 U
1,2-dichlorobenzene	600	0.50 U	**5.4**	**2.2**	**1.7 J**	5.0 U	**0.51**	0.50 U	10.0 U	0.50 U	0.50 U	5.0 U	2.5 U	1.0 U	0.50 U	0.50 U	0.50 U
1,2-dichloroethane	5	0.50 U	5.0 U	2.0 U	5.0 U	5.0 U	0.50 U	0.50 U	10.0 U	**0.54**	0.50 U	5.0 U	2.5 U	**0.46 J**	0.50 U	0.50 U	0.50 U
1,3-dichlorobenzene		0.50 U	5.0 U	2.0 U	5.0 U	5.0 U	0.50 U	0.50 U	10.0 U	0.50 U	0.50 U	5.0 U	2.5 U	1.0 U	0.50 U	0.50 U	0.50 U
1,4-dichlorobenzene	75	0.50 U	**17.0**	**7.0**	**6.3**	**2.7 J**	**5.0**	0.50 U	10.0 U	0.50 U	0.50 U	5.0 U	2.5 U	1.0 U	0.50 U	0.50 U	0.50 U
acetone		6.4 U	50.0 U	20.0 U	50.0 U	50.0 U	**2.5 J**	47.0 U	160 U	9.3 U	14.0 U	100 U	54.0 U	**16.0**	8.7 U	6.8 U	8.8 U
benzene	5	0.50 U	14.0	32.0	60.0	8.1	18.0	0.50 U	10.0 U	0.50 U	0.50 U	5.0 U	2.5 U	1.0 U	0.50 U	0.50 U	0.50 U
carbon disulfide		0.50 U	5.0 U	2.0 U	5.0 U	5.0 U	0.50 U	0.50 U	10.0 U	0.50 U	0.50 U	5.0 U	**23.0**	1.0 U	0.50 U	0.50 U	0.50 U
carbon tetrachloride	5	**1.7**	5.0 U	2.0 U	5.0 U	5.0 U	0.50 U	0.50 U	35.0	0.50 U	**3.2**	12.0	15.0	**2.1**	**0.70**	**2.0**	**1.7**
chlorobenzene	100	0.50 U	**85.0**	**71.0**	140	180	**28.0**	0.50 U	10.0 U	0.50 U	0.50 U	5.0 U	2.5 U	1.0 U	**0.98**	0.50 U	0.50 U
chloroform	80	**1.7**	5.0 U	2.0 U	5.0 U	5.0 U	0.50 U	0.50 U	10.0 U	0.50 U	**0.55**	5.0 U	2.5 U	**1.1**	**0.32 J**	**0.43 J**	**1.1**
chloromethane		0.50 U	5.0 U	2.0 U	5.0 U	5.0 U	0.50 U	0.50 U	10.0 U	0.50 U	0.50 U	5.0 U	2.5 U	1.0 U	0.50 U	0.50 U	0.50 U
cis-1,2-dichloroethene	70	0.50 U	5.0 U	2.0 U	5.0 U	5.0 U	0.50 UJ	0.50 U	**10.0**	0.50 U	0.50 U	**2.2 J**	**4.5**	**1.5**	**0.16 J**	**7.3**	**1.2**
cis-1,3-dichloropropene		0.50 U	5.0 U	2.0 U	5.0 U	5.0 U	0.50 U	0.50 U	10.0 U	0.50 U	0.50 U	5.0 U	2.5 U	1.0 U	0.50 U	0.50 U	0.50 U
ethylbenzene	700	0.50 U	**0.30 J**	2.0 U	5.0 U	**11.0**	0.50 U	0.50 U	10.0 U	0.50 U	0.50 U	5.0 U	2.5 U	1.0 U	0.50 U	0.50 U	0.50 U
isopropylbenzene		0.50 U	**0.40 J**	**0.33 J**	5.0 U	**1.1 J**	**0.65**	0.50 UJ	10.0 UJ	0.50 UJ	0.50 UJ	5.0 U	2.5 U	1.0 U	0.50 U	0.50 U	0.50 U
tetrachloroethene (PCE)	5	**1.5**	5.0 U	2.0 U	5.0 U	5.0 U	0.50 U	**0.30 J**	100	0.50 U	12.0	64.0	**4.0**	**1.1**	**0.37 J**	5.4	5.3
toluene	1,000	0.50 U	**0.43 J**	**0.22 J**	5.0 U	**1.6 J**	**0.30 J**	0.50 U	10.0 U	0.50 U	0.50 U	5.0 U	2.5 U	1.0 U	0.50 U	0.50 U	0.50 U
trans-1,2-dichloroethene	100	0.50 U	5.0 U	2.0 U	5.0 U	5.0 U	0.50 UJ	0.50 U	10.0 U	0.50 U	0.50 U	5.0 U	2.5 U	1.0 U	0.50 U	0.50 U	0.50 U
trichloroethene	5	12.0	5.0 U	2.0 U	5.0 U	5.0 U	0.50 U	**0.64**	270	**0.76**	7.3	82.0	76.0	20.0	**0.81**	13.0	7.0
trichlorofluoromethane		0.50 U	5.0 U	2.0 U	5.0 U	5.0 U	0.50 U	0.50 U	10.0 U	0.50 U	0.50 U	5.0 U	2.5 U	1.0 U	0.50 U	0.50 U	0.50 U
vinyl chloride	2	0.50 U	5.0 U	2.0 U	5.0 U	5.0 U	0.50 U	0.50 U	10.0 U	0.50 U	0.50 U	5.0 U	2.5 U	4.7	0.50 U	0.50 U	0.50 U
xylenes	10,000	0.50 U	**2.3 J**	2.0 U	**1.9 J**	**15.0**	**0.57**	**0.29 J**	10.0 U	0.50 U	0.50 U	5.0 U	2.5 U	1.0 U	0.50 U	0.50 U	0.50 U
Inorganics (µg/L)																	
aluminum		N/A	**4,560**	**131 J**	**103 J**	**175 J**	**377**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
antimony	6	N/A	32.7 J	21.4 J	15.4 J	24.9 J	20.5 J	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
arsenic	10[b]	N/A	5.4 U	**8.2 J**	12.6 J	25.2	55.5 J	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
barium	2,000	N/A	**1,480**	**1,490**	**950**	**695**	**259**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
cadmium	5	N/A	0.30 U	0.30 U	0.30 U	**1.0 J**	**0.67 J**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
calcium		N/A	**71,400**	**168,000**	**137,000**	**128,000**	**55,700**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
chromium	100	N/A	**8.2 J**	**5.8 J**	**7.9 J**	**7.4 J**	**5.7 J**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
cobalt		N/A	**5.9 J**	**3.7 J**	**7.1 J**	**5.7 J**	**0.97 J**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
copper	1,300[a]	N/A	**39.3**	**2.9 J**	**3.7 J**	**2.0 J**	**6.4 J**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
cyanide	200	N/A	**1.2 J**	**1.2 J**	**0.60 J**	**0.80 J**	0.60 U	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
iron		N/A	**81,400**	**64,100**	**45,000**	**30,900**	**59,200**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
lead	15[a]	N/A	**3.4**	**4.2**	**2.9 J**	**14.8**	**9.3**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
magnesium		N/A	**86,400**	**26,800**	**62,500**	**55,500**	**11,800**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
manganese		N/A	**344**	**313**	**171**	**85.9**	**1,280**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
mercury	2	N/A	**0.10 J**	0.10 UJ	2.3 J	**0.10 J**	0.10 UJ	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
nickel[c]		N/A	191	**47.1**	**59.7**	116	**20.3 J**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
potassium		N/A	**79,500**	**39,100**	**68,200**	**132,000**	**15,100**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
sodium		N/A	**301,000**	**30,700**	**118,000**	**285,000**	**57,800**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
vanadium		N/A	1.1 U	1.1 U	**4.1 J**	**9.2 J**	1.1 U	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
zinc		N/A	**137**	0.70 U	**190**	**124**	**657**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
Data qualifiers:
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"U" - not detected (reported at detection limit).
"UJ" - not detected (estimated detection limit).
-- µg/L - micrograms per liter.
-- N/A indicates parameter not analyzed and/or value not available.
-- Bolded values indicate detections.
-- Shaded areas indicate concentrations exceeding the RL/MCL.
-- Screened intervals are given in feet below ground surface.
[a] - Lead action level is 15 µg/l (TT) and copper action level is 1300 µg/l (The values are based on Record of Decision for the NPL Site, OU1 and OU3, 2000, Table 2).
[b] - The new MCL for Arsenic (10 ppb) is used in this report. It was adopted by EPA on 22 January 2001 and will go in effect beginning 23 January 2006.
[c] - Former US EPA MCL for nickel was 100 µg/L. The MCL was "remanded" on 9 February 1995.
[1] - If not otherwise specified, RLs (Remedial Levels) are equal to MCLs (Maximum Contaminant Levels) for Drinking Water (Drinking Water Regulations and Health Advisories, July 2002).
[2] - RW1, RW2, RW3, and RW6 are included in this table since they were used in this period for monitoring purposes only. However, RW1 was used as an for extraction well for a short period of time (02/24/2005 - 06/01/2005).

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UPROV - Upper Providence.
PC - Peat/Clay.
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QUAT - Quaternary Alluvium.
SURF - Surficial.
CUSSETA - Cusetta.

Sample type:
NORM - Normal.

GA060142
Table6-6 AnalyticalSummary-MontrWells.xls

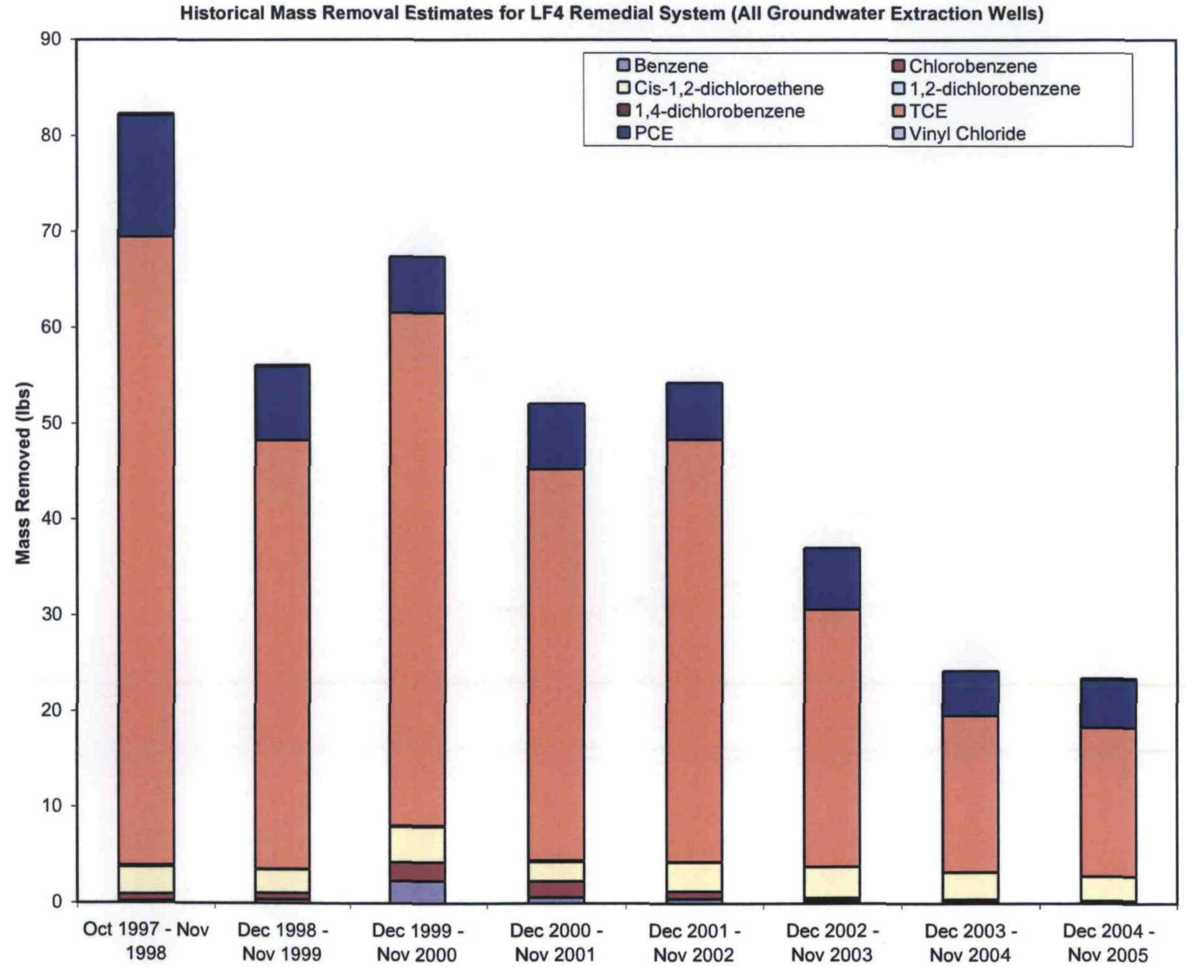
Table No. 6-7
Summary of Contaminant-Specific Mass Removal Estimates for NPL Site Groundwater Recovery System

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

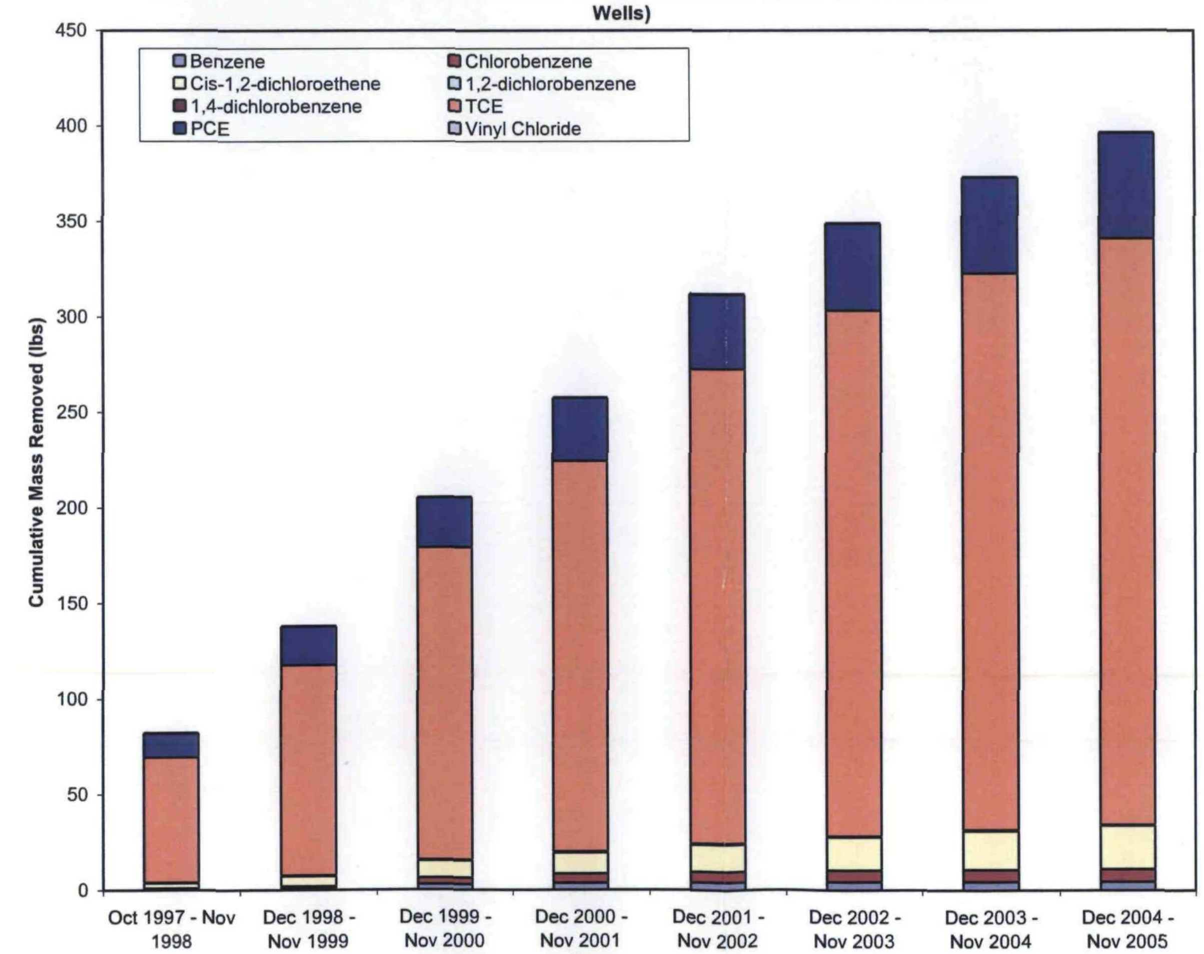
Reporting Period	Total Annual Flow (gal)	1,2-dichlorobenzene Average Mass Removed (lbs)	1,4-dichlorobenzene Average Mass Removed (lbs)	Benzene Average Mass Removed (lbs)	Chlorobenzene Average Mass Removed (lbs)	Cis-1,2-dichloroethene Average Mass Removed (lbs)	PCE Average Mass Removed (lbs)	TCE Average Mass Removed (lbs)	Vinyl Chloride Average Mass Removed (lbs)	Total Organics Average Mass Removed (lbs)
Dec 2004 - Nov 2005	48,608,086	0.0	0.0	0.0	0.3	2.5	5.0	15.5	0.2	23.4
Dec 2003 - Nov 2004	46,104,333	0.0	0.0	0.2	0.2	2.8	4.7	16.3	0.0	24.2
Dec 2002 - Nov 2003	52,241,457	0.0	0.0	0.3	0.3	3.2	6.4	26.8	0.0	37.0
Dec 2001 - Nov 2002	50,402,798	0.0	0.0	0.5	0.8	3.1	5.9	44.0	0.0	54.2
Dec 2000 - Nov 2001	60,627,236	0.0	0.1	0.6	1.7	2.1	6.9	40.7	0.0	52.0
Dec 1999 - Nov 2000	61,265,292	0.0	0.1	2.3	1.9	3.7	5.9	53.4	0.0	67.4
Dec 1998 - Nov 1999	72,844,348	0.0	0.0	0.4	0.7	2.5	7.7	44.6	0.2	56.1
Oct 1997 - Nov 1998	76,681,957	0.0	0.2	0.2	0.7	2.8	12.6	65.5	0.2	82.3
Overall*	**468,775,507**	**0.0**	**0.4**	**4.4**	**6.5**	**22.8**	**55.1**	**306.8**	**0.5**	**396.6**

Notes:
*The sum of the masses of the individual reporting periods may not be equal to the overall mass due to rounding.
-- RW1 through RW6 began pumping in October 1997.
-- RW1 began operating in October 1997 and was shut down on 11 February 1999 with regulatory approval. However, RW1 was temporarily reactivated from 24 February 2005 to 1 June 2005.
-- RW2, RW3, and RW6 discontinued pumping in May 2002 with regulatory approval.

Historical Mass Removal Estimates for LF4 Remedial System (All Groundwater Extraction Wells)



Cumulative Historical Mass Removal Estimates for LF4 Remedial System (All Groundwater Extraction Wells)



GA060142
Table6-7 and 6-8 HistMassRemoval.xls

Table No. 6-8
Summary of Total Organics Mass Removal Rates for NPL Site Groundwater Recovery System Components

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

	RW1			RW2			RW3			RW4			RW5			RW6			LF04 AREA TOTAL		
Reporting Period	Total Organics Removed (lbs)	Total Annual Flow (gal)	Organics Removal Rate (lbs/Mgal)*	Total Organics Removed (lbs)	Total Annual Flow (gal)	Organics Removal Rate (lbs/Mgal)*	Total Organics Removed (lbs)	Total Annual Flow (gal)	Organics Removal Rate (lbs/Mgal)*	Total Organics Removed (lbs)	Total Annual Flow (gal)	Organics Removal Rate (lbs/Mgal)*	Total Organics Removed (lbs)	Total Annual Flow (gal)	Organics Removal Rate (lbs/Mgal)*	Total Organics Removed (lbs)	Total Annual Flow (gal)	Organics Removal Rate (lbs/Mgal)*	Total Organics Removed (lbs)	Total Annual Flow (gal)	Organics Removal Rate (lbs/Mgal)*
Dec 2004 - Nov 2005	0.9	3,842,203	0.2	--	--	--	--	--	--	19.9	24,173,115	0.8	2.7	20,592,768	0.1	--	--	--	23.4	48,608,086	0.5
Dec 2003 - Nov 2004	--	--	--	--	--	--	--	--	--	20.7	27,433,472	0.8	3.5	18,670,862	0.2	--	--	--	24.2	46,104,333	0.5
Dec 2002 - Nov 2003	--	--	--	--	--	--	--	--	--	30.5	27,822,552	1.1	6.5	24,418,905	0.3	--	--	--	37.0	52,241,457	0.7
Dec 2001 - Nov 2002	--	--	--	0.9	4,432,142	0.2	1.6	5,781,913	0.3	23.8	15,900,186	1.5	26.0	18,555,348	1.4	1.9	5,733,209	0.3	54.2	50,402,798	1.1
Dec 2000 - Nov 2001	--	--	--	1.9	9,175,057	0.2	3.4	13,239,577	0.3	19.4	14,119,760	1.4	21.5	11,132,467	1.9	5.9	12,960,375	0.5	52.0	60,627,236	0.9
Dec 1999 - Nov 2000	--	--	--	1.3	9,640,637	0.1	2.7	13,402,874	0.2	11.8	13,686,912	0.9	42.3	12,087,731	3.5	9.3	12,447,138	0.7	67.4	61,265,292	1.1
Dec 1998 - Nov 1999	0.2	1,671,814	0.1	0.9	9,332,193	0.1	3.9	15,415,229	0.3	20.9	18,330,058	1.1	11.4	13,881,084	0.8	18.8	14,213,970	1.3	56.1	72,844,348	0.8
Oct 1997 - Nov 1998	1.2	8,991,794	0.1	1.8	9,109,819	0.2	4.5	16,918,510	0.3	29.6	16,874,663	1.8	19.4	12,225,317	1.6	25.8	12,561,854	2.1	82.3	76,681,957	1.1
Overall	2.4	14,505,811	0.2	6.8	41,689,848	0.2	16.0	64,758,103	0.2	176.5	158,340,717	1.1	133.3	131,564,482	1.0	61.6	57,916,546	1.1	396.6	468,775,507	0.8

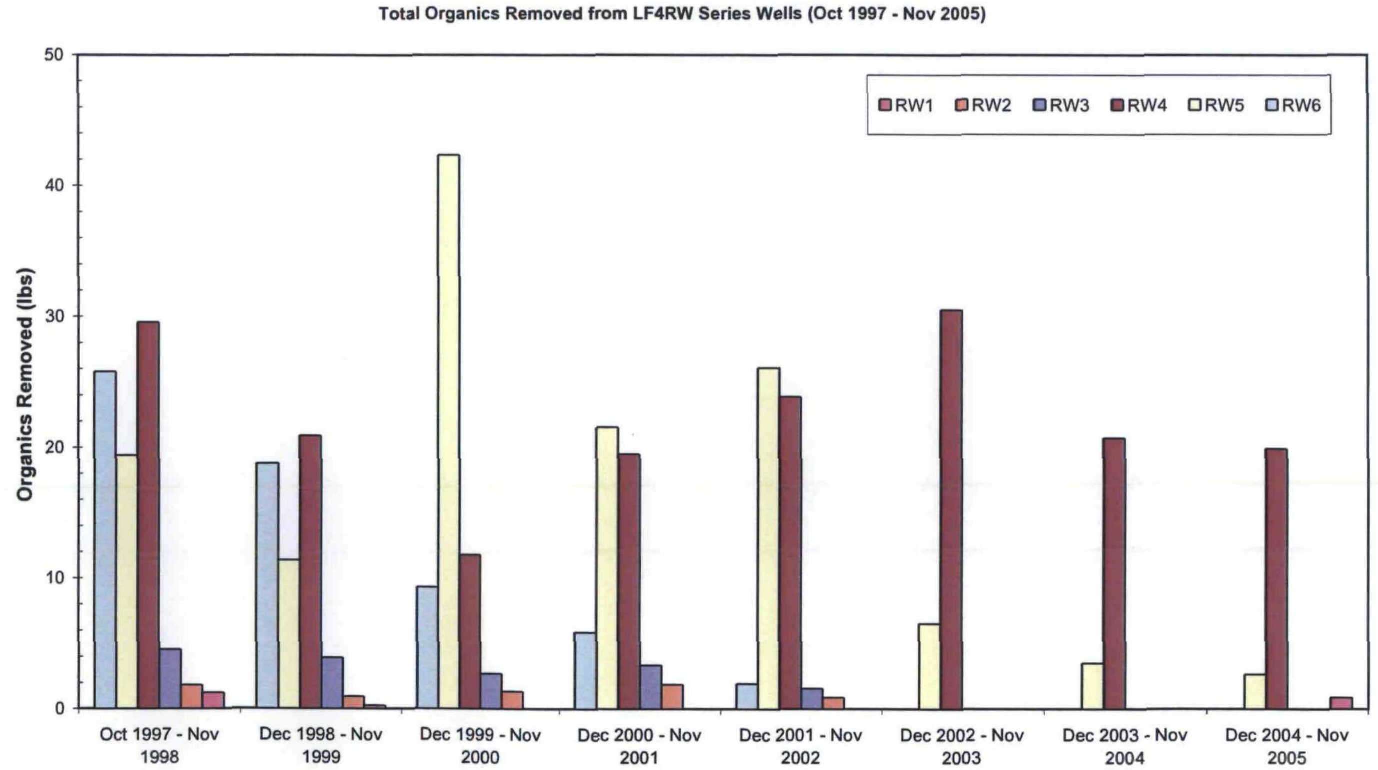
Notes:

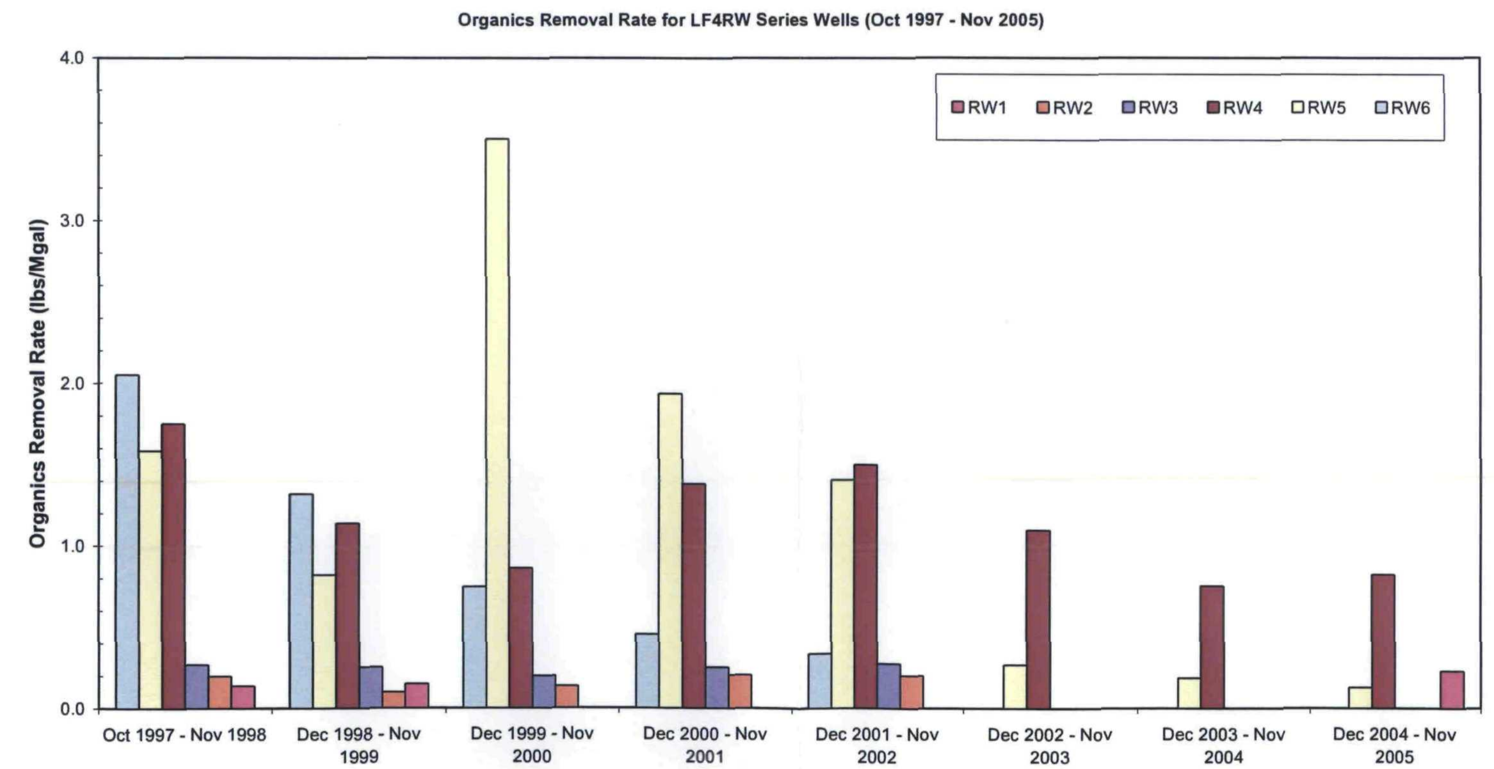
1) The sum of the masses of the individual reporting periods may not be equal to the overall mass due to rounding.

2) RW1 began operating in October 1997 and was shut down on 11 February 1999 with regulatory approval. However, RW1 was temporarily reactivated from 24 February 2005 to 1 June 2005.

*Mgal : Million gallons.

-- Pump not operational in the given period of time.





GA060142
Table6-7 and 6-8 HistMassRemoval.xls

FIGURES

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LEGEND

STORM WATER DRAINS
GAS VENT PIPING
GAS VENT LOCATION
LF04 AREA DESIGNATION BOUNDARIES
LF04 BOUNDARY
FORMER SLUDGE LAGOON (WP 14)

NOTES:
1. AERIAL PHOTO TAKEN MARCH 2005.
2. THE LANDFILL GAS CONCENTRATIONS AND TRENDS HAVE HISTORICALLY BEEN ANALYZED FOR THREE ARBITRARY GEOGRAPHIC DIVISIONS OF THE LANDFILL REFERRED TO AS AREA 1, AREA 2, AND AREA 3.
THESE AREAS WERE PREVIOUSLY ESTABLISHED BY DIVIDING THE LANDFILL INTO THREE AREAS WITH AN APPROXIMATELY EQUAL NUMBER OF GAS VENTS.

0 100 200 400 Feet

WRALC
ROBINS AIR FORCE BASE, GEORGIA

PREPARED BY	GeoSyntec Consultants WARNER ROBINS, GEORGIA		
PROJECT NO.	GW0039/9/1		
DOCUMENT NO.	GA060142		
FILE NO.	FIG6-1.MXD		
PREPARED BY	WL	DATE:	04/10/2006
CHECKED BY	TH	DATE:	04/11/2006

PREPARED FOR
ENVIRONMENTAL MANAGEMENT ROBINS AFB
DELIVERY ORDER Q601 TASK NO. 9

PROJECT NAME: SECOND FIVE-YEAR REVIEW REPORT FOR THE NPL SITE, OU1 AND OU3

SITE DESCRIPTION: ROBINS AFB, GEORGIA

FIGURE DESCRIPTION: LF04 AREA DESIGNATION BOUNDARIES

FIGURE NO. 6-1

F:\robinafb\GIS\mxd\D5037_9(1)_LF04_5yrReview

N

LEGEND

- LF4-28 250.62 — SURFICIAL MONITORING WELL AND GROUNDWATER ELEV. (ft MSL)
- 256 — GROUNDWATER ELEVATION CONTOUR (ft MSL)
- DIRECTION OF GROUNDWATER FLOW
- APPROX. QUATERNARY ALLUVIUM CONTACT
- LF04 BOUNDARY
- FORMER SLUDGE LAGOON (WP 14)

NOTES:
1. WATER LEVELS RECORDED APRIL 2005.
2. VALUES IN ( ) NOT USED FOR CONTOURING.

0 200 400 800 Feet

WRALC
ROBINS AIR FORCE BASE, GEORGIA

PREPARED BY: GeoSyntec Consultants, WARNER ROBINS, GEORGIA			
PROJECT NO.	GW0039/9/1		
DOCUMENT NO.	GA060142		
FILE NO.	FIG6-2.MXD		
PREPARED BY	WL	DATE:	04/12/2006
CHECKED BY	TH	DATE:	04/12/2006

PREPARED FOR
ENVIRONMENTAL MANAGEMENT
ROBINS AFB
DELIVERY ORDER Q601
TASK NO. 9

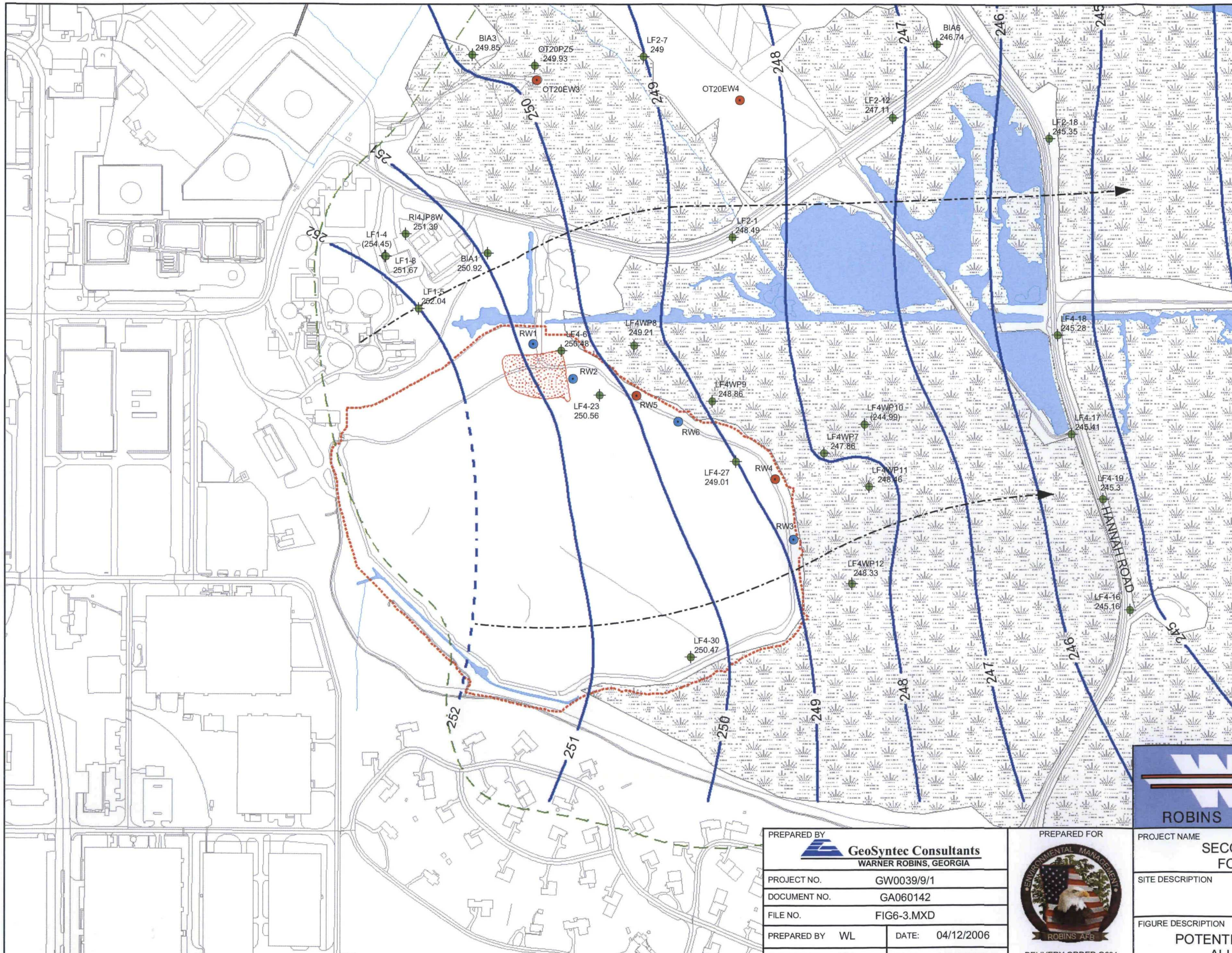
PROJECT NAME: SECOND FIVE-YEAR REVIEW REPORT FOR THE NPL SITE, OU1 AND OU3

SITE DESCRIPTION: ROBINS AFB, GEORGIA

FIGURE DESCRIPTION: POTENTIOMETRIC MAP (2005) SURFICIAL AQUIFER

FIGURE NO. 6-2

F:\robinafb\GIS\mxd\D5037_9(1)_LF04_5yrReview



N

LEGEND

RW4	ALLUVIAL RECOVERY WELL
RW3	ALLUVIAL RECOVERY WELL (INACTIVE)
LF4-18 245.28	ALLUVIAL MONITORING WELL AND GROUNDWATER ELEV. (ft MSL)
250	GROUNDWATER ELEVATION CONTOUR (ft MSL; inferred where dashed)
	DIRECTION OF GROUNDWATER FLOW
	APPROX. QUATERNARY ALLUVIUM CONTACT
	LF04 BOUNDARY
	FORMER SLUDGE LAGOON (WP 14)

NOTES:
1. WATER LEVELS RECORDED APRIL 2005.
2. RW1 WAS SHUT DOWN WITH REGULATORY APPROVAL IN FEBRUARY 1999. RW1 WAS TEMPORARILY REACTIVATED FROM 24 FEBRUARY 2005 TO 1 JUNE 2005.
3. VALUES IN ( ) NOT USED FOR CONTOURING.

0 200 400 800 Feet

WRALC
ROBINS AIR FORCE BASE, GEORGIA

PREPARED BY	GeoSyntec Consultants, WARNER ROBINS, GEORGIA
PROJECT NO.	GW0039/9/1
DOCUMENT NO.	GA060142
FILE NO.	FIG6-3.MXD
PREPARED BY WL	DATE: 04/12/2006
CHECKED BY TH	DATE: 04/12/2006

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ENVIRONMENTAL MANAGEMENT ROBINS AFB
DELIVERY ORDER Q601
TASK NO. 9

PROJECT NAME
SECOND FIVE-YEAR REVIEW REPORT FOR THE NPL SITE, OU1 AND OU3

SITE DESCRIPTION
ROBINS AFB, GEORGIA

FIGURE DESCRIPTION
POTENTIOMETRIC MAP (2005) ALLUVIAL AQUIFER

FIGURE NO.
6-3

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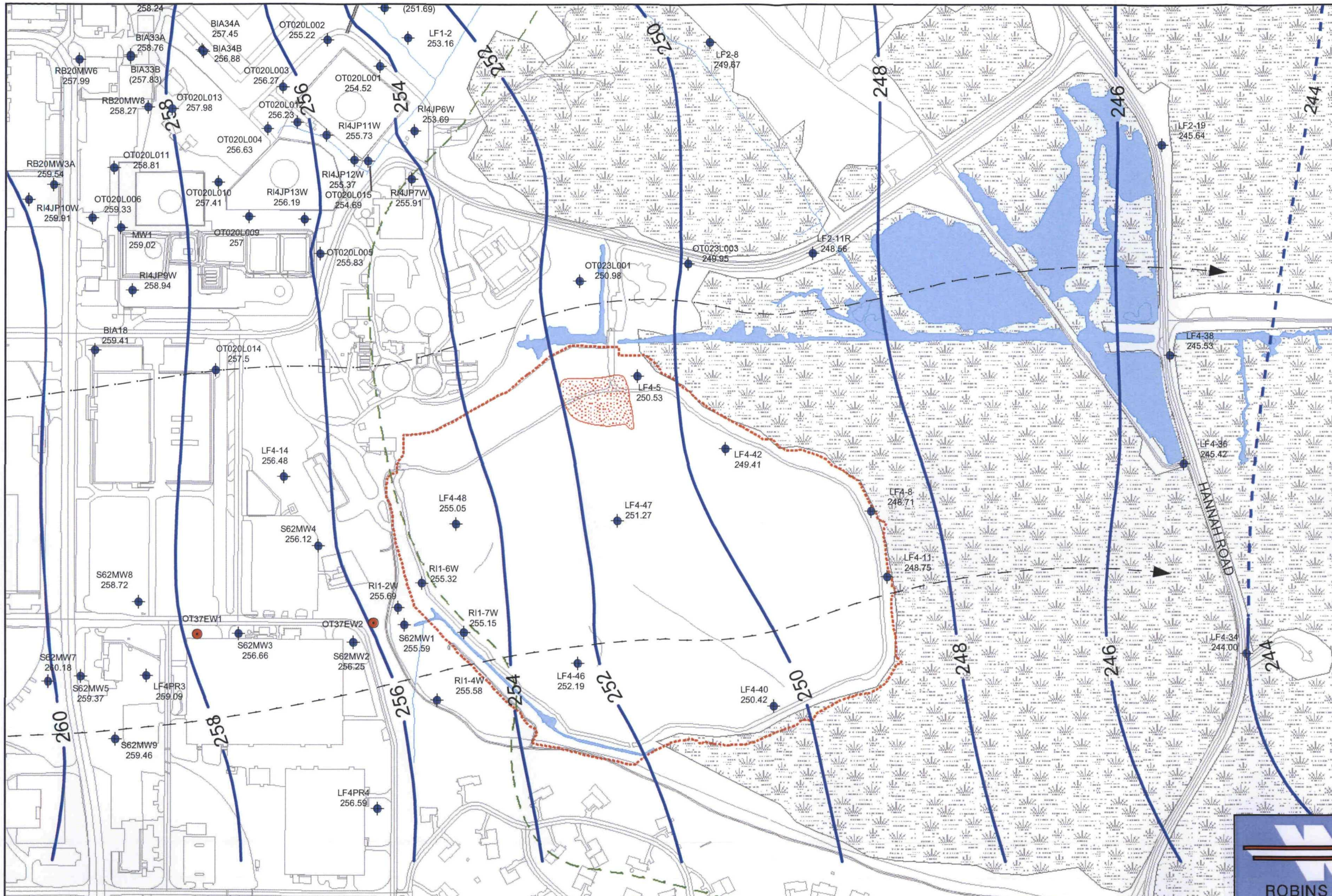

N

LEGEND

- OT37EW1 — UPPER PROVIDENCE EXTRACTION WELL
- LF4-38 245.53 — UPPER PROVIDENCE MONITORING WELL AND GROUNDWATER ELEV. (ft MSL)
- 256 — GROUNDWATER ELEVATION CONTOUR (ft MSL; inferred where dashed)
- DIRECTION OF GROUNDWATER FLOW
- APPROX. QUATERNARY ALLUVIUM CONTACT
- LF04 BOUNDARY
- FORMER SLUDGE LAGOON (WP14)

NOTES:
1. WATER LEVELS RECORDED APRIL 2005.
2. VALUES SHOWN IN ( ) NOT USED FOR CONTOURING.

0 200 400 800 Feet

WR-ALC
ROBINS AIR FORCE BASE, GEORGIA

PREPARED BY
GeoSyntec Consultants
WARNER ROBINS, GEORGIA

PROJECT NO.	GW0039/9/1
DOCUMENT NO.	GA060142
FILE NO.	FIG6-4.MXD
PREPARED BY WL	DATE: 04/12/2006
CHECKED BY TH	DATE: 04/12/2006

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ENVIRONMENTAL MANAGEMENT
ROBINS AFB
DELIVERY ORDER Q601
TASK NO. 9

PROJECT NAME
SECOND FIVE-YEAR REVIEW REPORT FOR THE NPL SITE, OU1 AND OU3

SITE DESCRIPTION
ROBINS AFB, GEORGIA

FIGURE DESCRIPTION
POTENTIOMETRIC MAP (2005)
UPPER PROVIDENCE AQUIFER

FIGURE NO.
6-4

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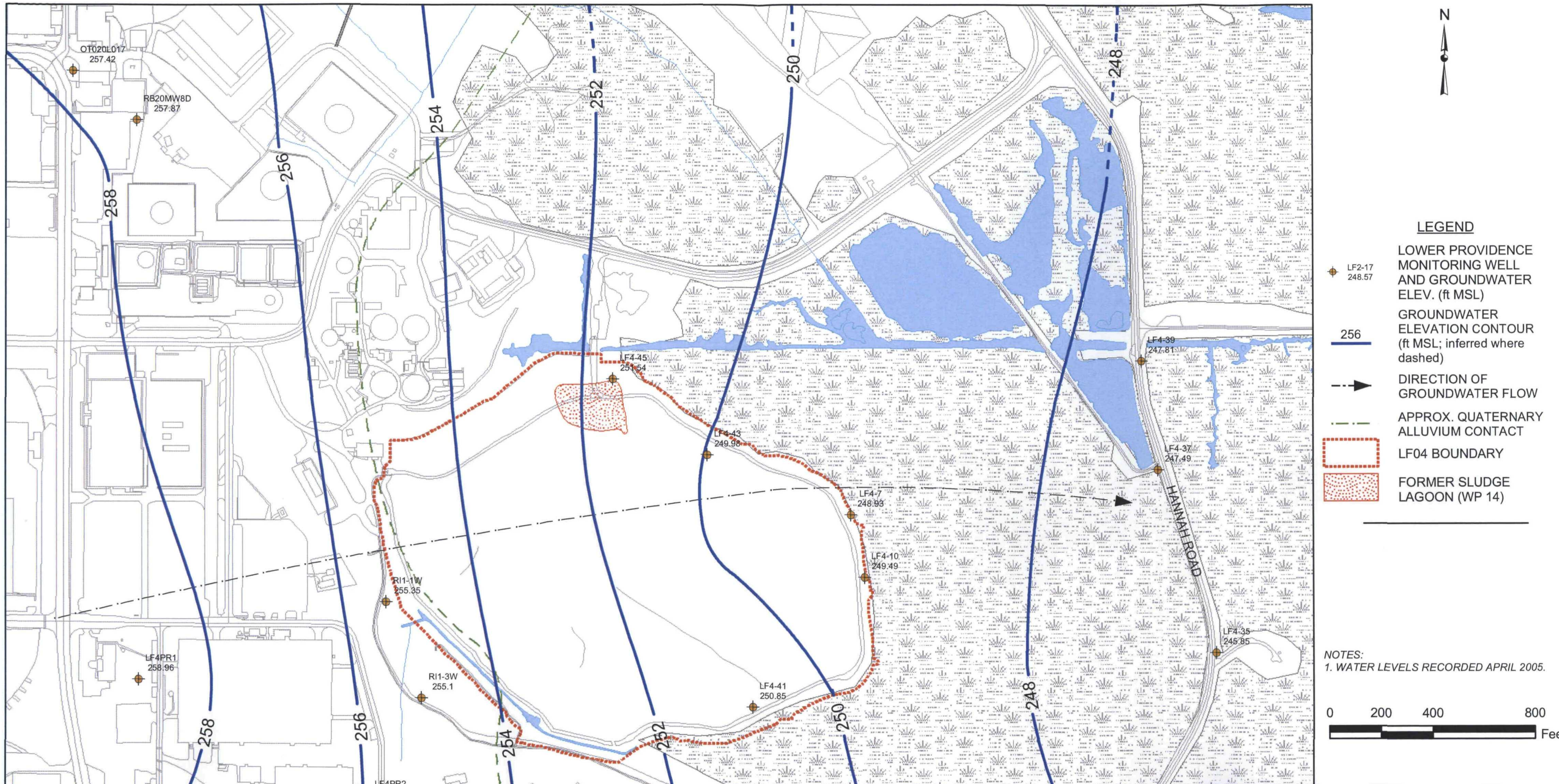

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ROBINS AIR FORCE BASE, GEORGIA

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PROJECT NO.	GW0039/9/1		
DOCUMENT NO.	GA060142		
FILE NO.	FIG6-5.MXD		
PREPARED BY	WL	DATE:	04/12/2006
CHECKED BY	TH	DATE:	04/12/2006

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ROBINS AFB
DELIVERY ORDER Q601
TASK NO. 9

PROJECT NAME
SECOND FIVE-YEAR REVIEW REPORT
FOR THE NPL SITE, OU1 AND OU3

SITE DESCRIPTION
ROBINS AFB, GEORGIA

FIGURE DESCRIPTION
POTENTIOMETRIC MAP (2005)
LOWER PROVIDENCE AQUIFER

FIGURE NO.
6-5

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LEGEND

- RW4 59.0 — ALLUVIAL RECOVERY WELL AND TCE CONCENTRATION (ug/L)
- RW3 13.0 — ALLUVIAL RECOVERY WELL (INACTIVE) AND TCE CONCENTRATION (ug/L)
- LF4-19 0.81 — ALLUVIAL MONITORING WELL AND TCE CONCENTRATION (ug/L)
- 10 — TCE CONCENTRATION CONTOUR (ug/L; inferred where dashed)
- APPROX. QUATERNARY ALLUVIUM CONTACT
- LF04 BOUNDARY
- FORMER SLUDGE LAGOON (WP 14)

NOTES:
1. *J - ESTIMATED CONCENTRATION*
2. *U - UNDETECTED; SHOWN AT DETECTION LIMIT VALUE*
3. *SAMPLES COLLECTED APRIL AND MAY 2005.*
4. *RW1 WAS SHUT DOWN WITH REGULATORY APPROVAL IN FEBRUARY 1999. RW1 WAS TEMPORARILY REACTIVATED FROM 24 FEBRUARY 2005 TO 1 JUNE 2005.*

0 200 400 800 Feet

ROBINS AIR FORCE BASE, GEORGIA

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PROJECT NO.	GW0039/9/1		
DOCUMENT NO.	GA060142		
FILE NO.	FIG6-6.MXD		
PREPARED BY	WL	DATE:	04/12/2006
CHECKED BY	TH	DATE:	04/12/2006

PREPARED FOR

ENVIRONMENTAL MANAGEMENT ROBINS AFB

DELIVERY ORDER Q601
TASK NO. 9

PROJECT NAME
SECOND FIVE-YEAR REVIEW REPORT
FOR THE NPL SITE, OU1 AND OU3

SITE DESCRIPTION
ROBINS AFB, GEORGIA

FIGURE DESCRIPTION
TCE CONCENTRATION (2005)
ALLUVIAL AQUIFER

FIGURE NO.
6-6

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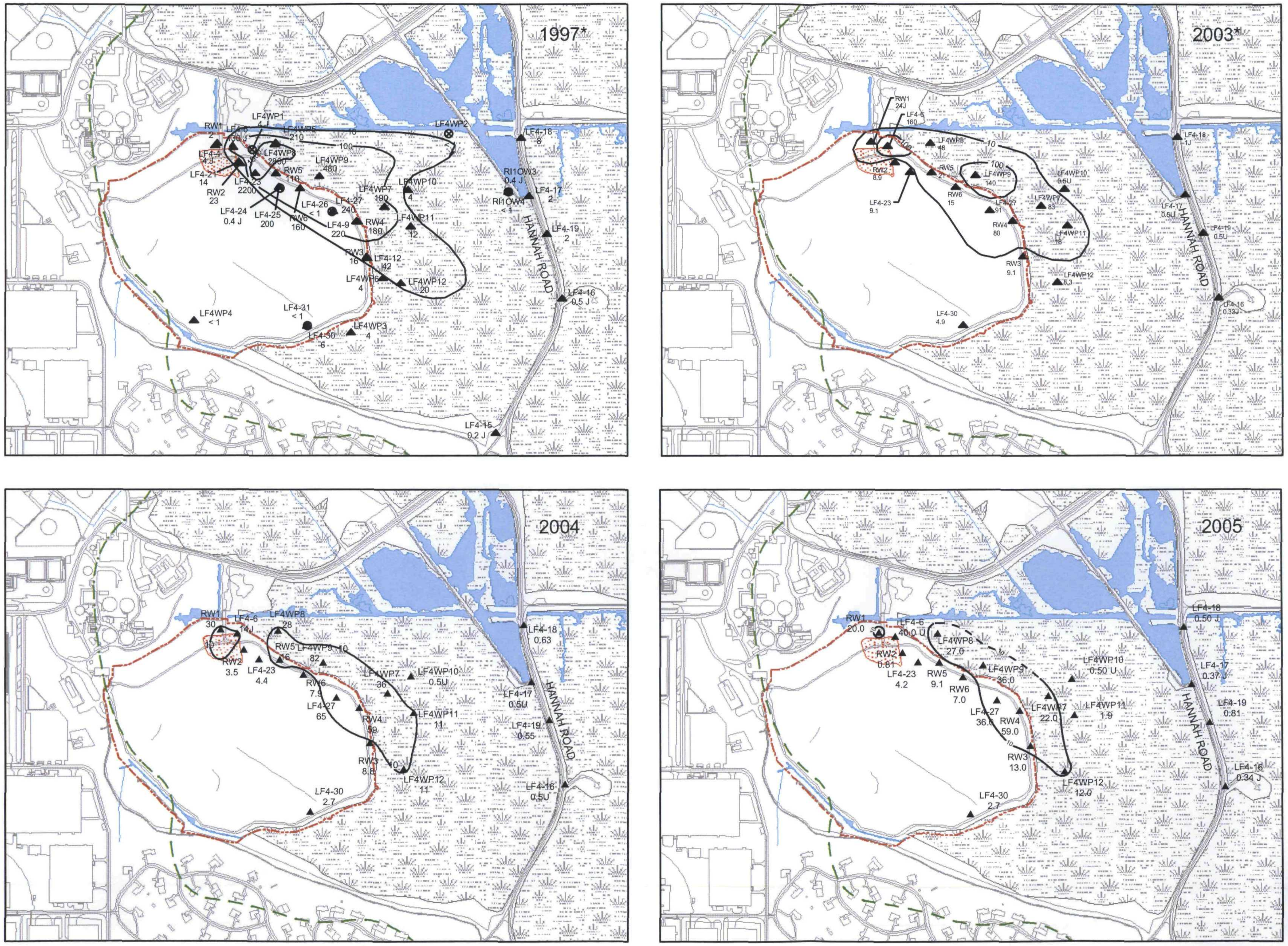

N

LEGEND

▲ LF4-30 2.7	ALLUVIAL MONITORING WELL AND TCE CONCENTRATION (ug/L)
10	TCE CONCENTRATION CONTOUR (ug/L; inferred where dashed)
	APPROX. QUATERNARY ALLUVIUM CONTACT
	LF04 BOUNDARY
	FORMER SLUDGE LAGOON (WP 14)

NOTES:
1. *HISTORIC TCE CONCENTRATIONS REPORTED FOR 1997 AND 2003 - 2005.*
2. *J - ESTIMATED*
3. *U- UNDETECTED; SHOWN AT DETECTION LIMIT VALUE*
4. *RW1 WAS SHUT DOWN WITH REGULATORY APPROVAL IN FEBRUARY 1999. RW1 WAS TEMPORARILY REACTIVATED FROM 24 FEBRUARY 2005 TO 1 JUNE 2005.*

0 400 800 1,600 Feet

* Historic figures and data (1997 & 2003) originated from the 2002/2003 GWTS Annual Progress Report prepared by EarthTech, Inc. (Project No. 62826). The minor formatting discrepancies seen between the historic and current perspectives *are the result of using different software packages in the figures' generation.*

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ROBINS AIR FORCE BASE, GEORGIA

PREPARED BY			
GeoSyntec Consultants WARNER ROBINS, GEORGIA			
PROJECT NO.	GW0039/9/1		
DOCUMENT NO.	GA060142		
FILE NO.	FIG6-7.MXD		
PREPARED BY	WL	DATE:	04/12/2006
CHECKED BY	TH	DATE:	04/12/2006

PREPARED FOR
ENVIRONMENTAL MANAGEMENT
ROBINS AFB
DELIVERY ORDER Q601
TASK NO. 9

PROJECT NAME	SECOND FIVE-YEAR REVIEW REPORT FOR THE NPL SITE, OU1 AND OU3
SITE DESCRIPTION	ROBINS AFB, GEORGIA
FIGURE DESCRIPTION	HISTORICAL TCE CONCENTRATION ALLUVIAL AQUIFER
FIGURE NO.	6-7

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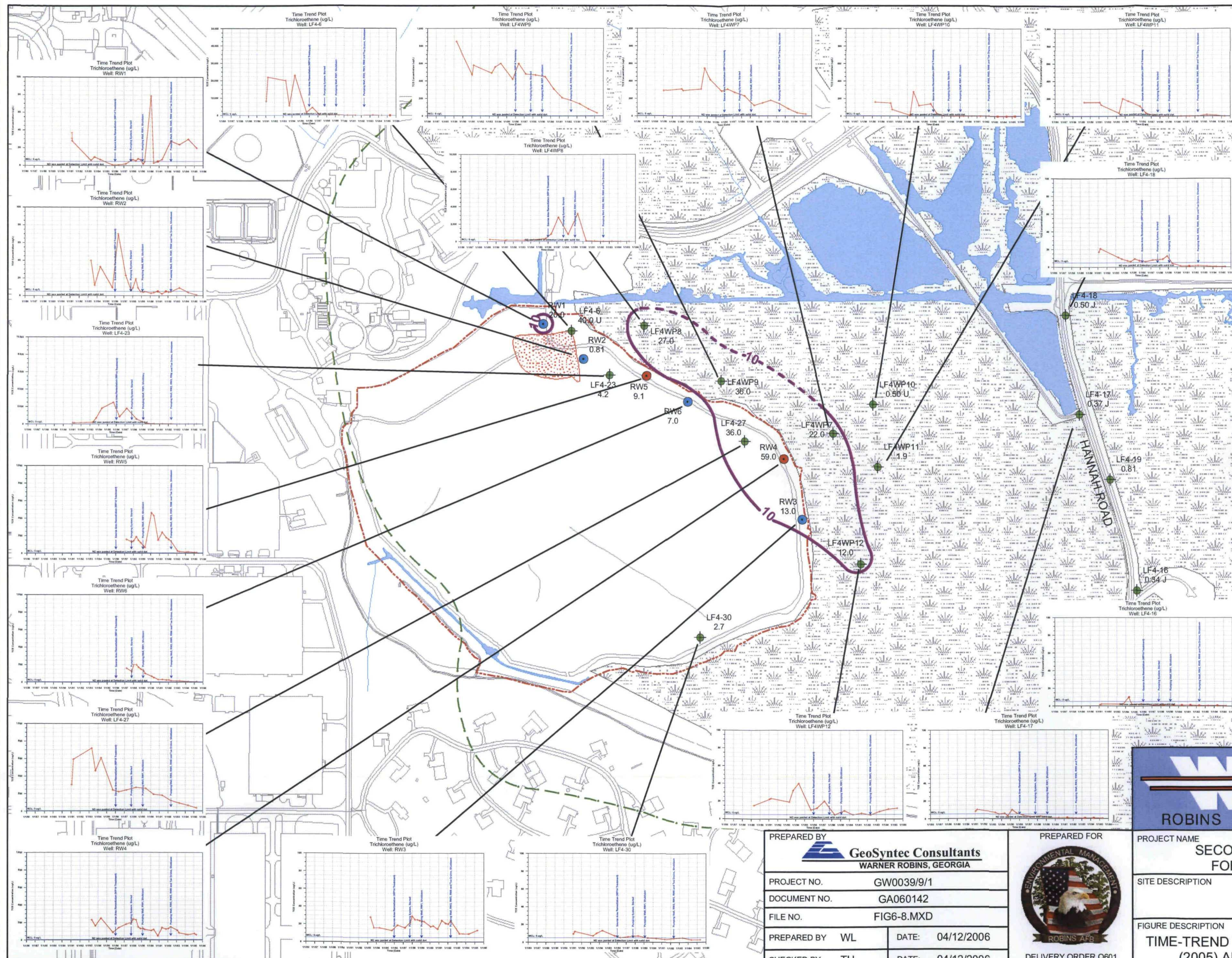

LEGEND

- RW4 59.0 — ALLUVIAL RECOVERY WELL AND TCE CONCENTRATION (ug/L)
- RW3 13.0 — ALLUVIAL RECOVERY WELL (INACTIVE) AND TCE CONCENTRATION (ug/L)
- LF4-19 0.81 — ALLUVIAL MONITORING WELL AND TCE CONCENTRATION (ug/L)
- 10 — TCE CONCENTRATION CONTOUR (ug/L; inferred where dashed)
- APPROX. QUATERNARY ALLUVIUM CONTACT
- LF04 BOUNDARY
- FORMER SLUDGE LAGOON (WP 14)

NOTES:
1. *J - ESTIMATED CONCENTRATION*
2. *U - UNDETECTED; SHOWN AT DETECTION LIMIT VALUE*
3. *SAMPLES COLLECTED APRIL AND MAY 2005.*
4. *RW1 WAS SHUT DOWN WITH REGULATORY APPROVAL IN FEBRUARY 1999. RW1 WAS TEMPORARILY REACTIVATED FROM 24 FEBRUARY 2005 TO 1 JUNE 2005.*
5. *FULL SIZE TIME-TRENDS AVAILABLE IN APPENDIX F.2.*

0 200 400 800 Feet

ROBINS AIR FORCE BASE, GEORGIA

PREPARED BY	GeoSyntec Consultants, WARNER ROBINS, GEORGIA
PROJECT NO.	GW0039/9/1
DOCUMENT NO.	GA060142
FILE NO.	FIG6-8.MXD
PREPARED BY WL	DATE: 04/12/2006
CHECKED BY TH	DATE: 04/12/2006

PREPARED FOR: ENVIRONMENTAL MANAGEMENT, ROBINS AFB
DELIVERY ORDER Q601
TASK NO. 9

PROJECT NAME: SECOND FIVE-YEAR REVIEW REPORT FOR THE NPL SITE, OU1 AND OU3

SITE DESCRIPTION: ROBINS AFB, GEORGIA

FIGURE DESCRIPTION: TIME-TREND TCE CONCENTRATION (2005) ALLUVIAL AQUIFER

FIGURE NO. 6-8

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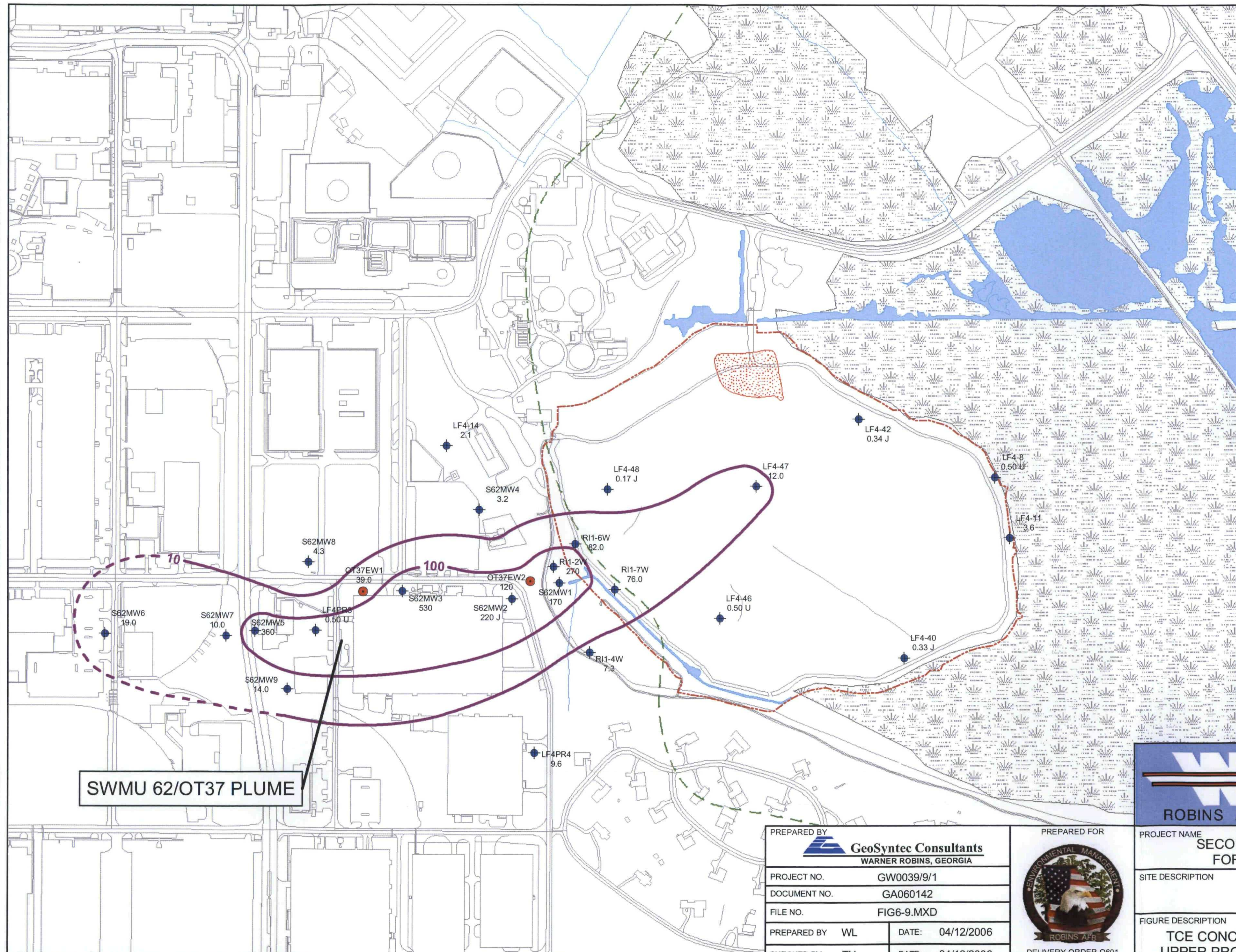

N

LEGEND

OT37EW1 39 — UPPER PROVIDENCE EXTRACTION WELL AND TCE CONCENTRATION (ug/L)

LF4-11 3.6 — UPPER PROVIDENCE MONITORING WELL AND TCE CONCENTRATION (ug/L)

10 — TCE CONCENTRATION CONTOUR (ug/L; inferred where dashed)

APPROX. QUATERNARY ALLUVIUM CONTACT

LF04 BOUNDARY

FORMER SLUDGE LAGOON (WP 14)

NOTES:
1. *SAMPLES COLLECTED APRIL AND MAY 2005.*
2. *J - ESTIMATED CONCENTRATION*
3. *U - UNDETECTED; SHOWN AT DETECTION LIMIT VALUE*
4. *THE UPPER PROVIDENCE PLUME ORIGINATED FROM SWMU 62/OT37 AND IS SEPARATE FROM THE NPL SITE OU3 QUATERNARY AQUIFER PLUME.*

0 200 400 800 Feet

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ROBINS AIR FORCE BASE, GEORGIA

PREPARED BY	GeoSyntec Consultants, WARNER ROBINS, GEORGIA		
PROJECT NO.	GW0039/9/1		
DOCUMENT NO.	GA060142		
FILE NO.	FIG6-9.MXD		
PREPARED BY	WL	DATE:	04/12/2006
CHECKED BY	TH	DATE:	04/12/2006

PREPARED FOR
ENVIRONMENTAL MANAGEMENT, ROBINS AFB
DELIVERY ORDER Q601
TASK NO. 9

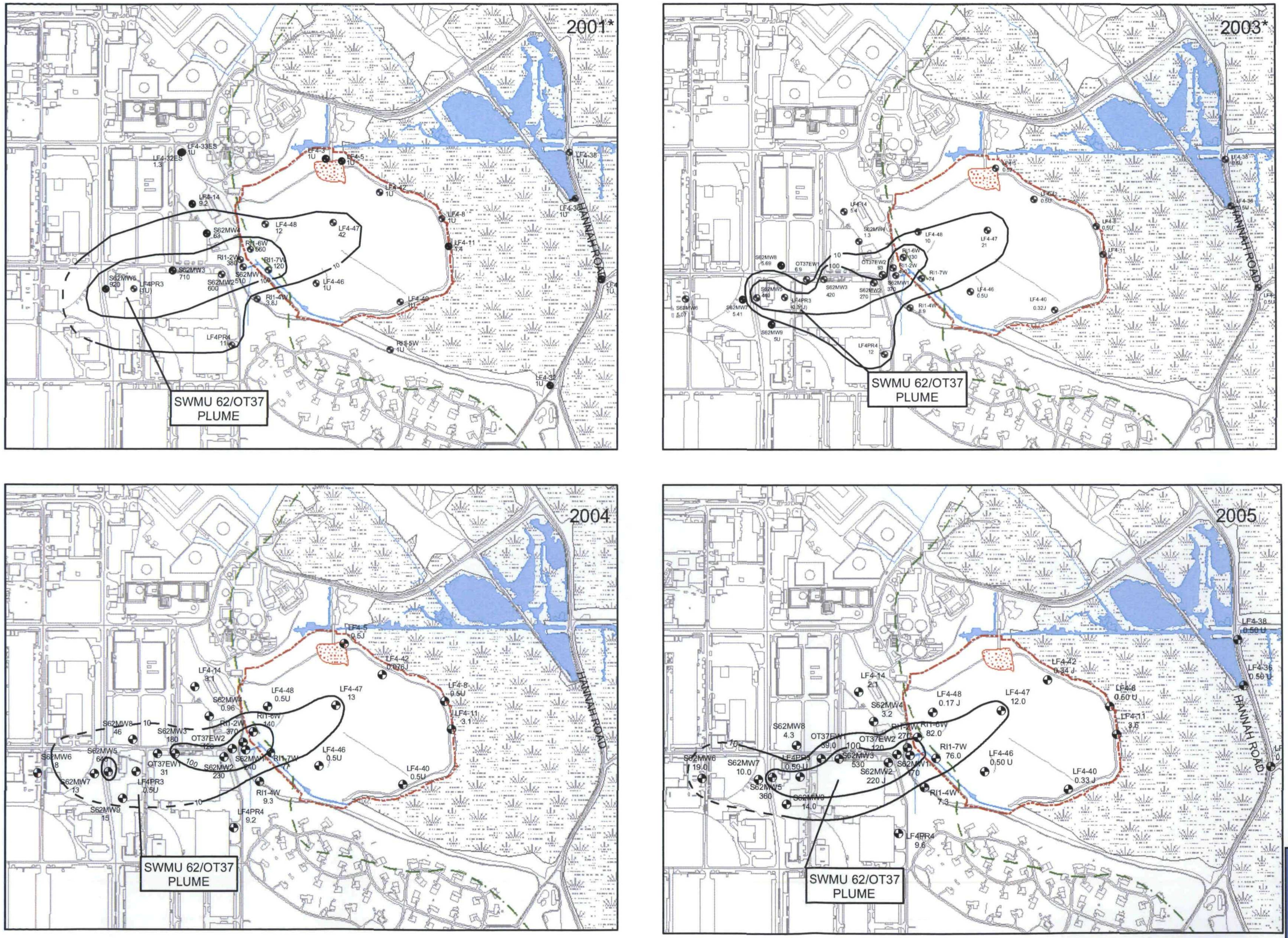
PROJECT NAME
SECOND FIVE-YEAR REVIEW REPORT FOR THE NPL SITE, OU1 AND OU3

SITE DESCRIPTION
ROBINS AFB, GEORGIA

FIGURE DESCRIPTION
TCE CONCENTRATION (2005) UPPER PROVIDENCE AQUIFER

FIGURE NO.
6-9

F:\robinafb\GIS\mxd\D5037_9(1)_LF04_5yrReview



N

LEGEND

- LF4-47 13 — UPPER PROVIDENCE MONITORING WELL AND TCE CONCENTRATION (ug/L)
- 10 — TCE CONCENTRATION CONTOUR (ug/L; inferred where dashed)
- APPROX. QUATERNARY ALLUVIUM CONTACT
- LF04 BOUNDARY
- FORMER SLUDGE LAGOON (WP 14)

NOTES:

1. *HISTORIC TCE CONCENTRATIONS REPORTED FROM 2001 AND 2003 - 2005.*
2. *J - ESTIMATED*
3. *U- UNDETECTED; SHOWN AT DETECTION LIMIT VALUE*
4. *THE UPPER PROVIDENCE PLUME ORIGINATED FROM SWMU 62/OT37 AND IS SEPARATE FROM THE NPL SITE OU3 QUATERNARY AQUIFER PLUME.*

0 500 1,000 2,000 Feet

* Historic figures and data (2001,2003) originated from the 2002/2003 GWTS Annual Progress Report prepared by EarthTech, Inc. (Project No. 62826). The minor formatting discrepancies seen between the historic and current perspectives are the result of using different software packages in the figures' generation.

WR-ALC
ROBINS AIR FORCE BASE, GEORGIA

PREPARED BY	GeoSyntec Consultants, WARNER ROBINS, GEORGIA
PROJECT NO.	GW0039/9/1
DOCUMENT NO.	GA060142
FILE NO.	FIG6-10.MXD
PREPARED BY	WL — DATE: 04/12/2006
CHECKED BY	TH — DATE: 04/12/2006

PREPARED FOR: ENVIRONMENTAL MANAGEMENT, ROBINS AFB
DELIVERY ORDER Q601
TASK NO. 9

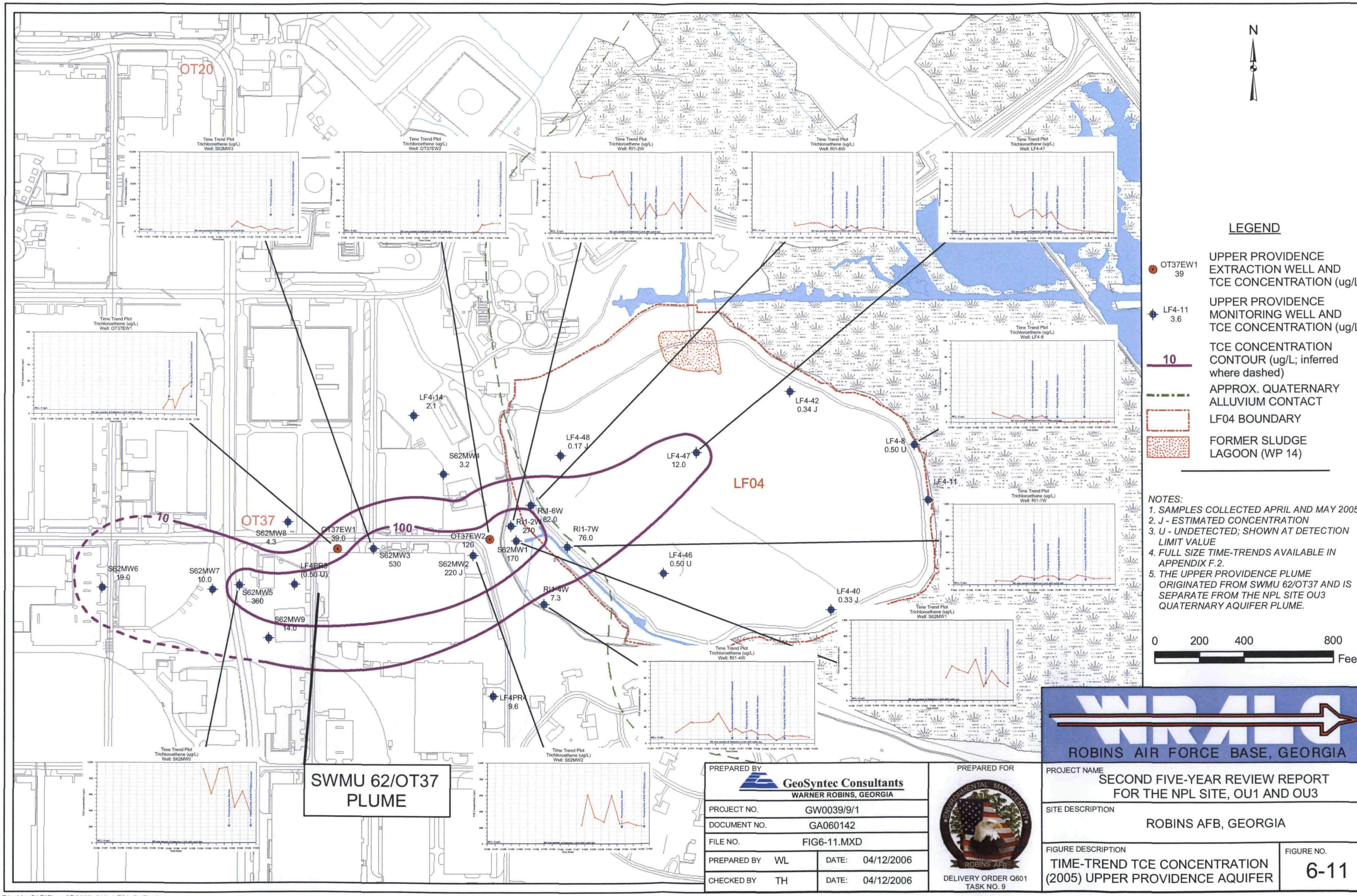
PROJECT NAME: SECOND FIVE-YEAR REVIEW REPORT FOR THE NPL SITE, OU1 AND OU3

SITE DESCRIPTION: ROBINS AFB, GEORGIA

FIGURE DESCRIPTION: HISTORICAL TCE CONCENTRATION UPPER PROVIDENCE AQUIFER

FIGURE NO. 6-10

F:\robinafb\GIS\mxd\D5037_9(1)_LF04_5yrReview



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7.0 TECHNICAL ASSESSMENT

7.1 OU1 SOURCE AREAS

7.1.1 Question A: Is the remedy functioning as intended by the decision document?

The RAOs for OU1 are containment and exposure control through source area treatment, construction of a landfill cover system with a passive gas venting system, surface water controls, and implementation of LUCs. For OU1, containment and exposure controls have been in place since the completion of interim measures in 1998. The details of these interim measures are described in 3.4. As discussed in 4.1 and 4.2, the Final ROD accepted these interim measures as part of the final remedy for OU1 and required no further action other than: (i) implementation of LUCs to restrict access to the site (land and groundwater) for future use; and (ii) O&M of the in place remedy.

7.1.1.1 Remedial Action Performance

Maintenance of the cover system over the LF04 and WP14 source areas along with LUCs ensure that all exposure pathways for contaminants associated with OU1 are incomplete or insignificant. As discussed in the Data Review and Evaluation (6.4.1), the OU1 remedy is functioning as intended in the Final ROD. There have been no changes in site conditions or remedy performance that resulted in failure of the remedy specified in the Final ROD.

A review of the passive landfill gas control system data collected between 2001 and 2005 combined with the visual observations indicate that the system is functioning as intended to prevent undesired gas pressure buildup beneath the cover system. The number of passive vents appears to be sufficient for the size of the landfill, in accordance with general landfill gas management practices. The data indicate that the installed passive system is sufficient to manage gas generation through the remaining life-cycle of the landfill.

The landfill cover system was inspected quarterly and routinely maintained by mowing the vegetative cover, repairing eroded areas, reseeding bare spots, preventing the encroachment of trees and bushes and the invasion of weeds, and fertilizing and liming the soil as necessary. Vegetative cover (i.e., grass) on the cover system is well established and is generally maintained to a height of 4 to 8 inches. The vegetative cover also prevents erosion and limits infiltration of rainwater. Repairs completed in 2003 have corrected localized areas of erosion identified in the first five-year review. The cover system is performing as intended to prevent direct exposure to contaminants in the landfill and to minimize the production of leachate.

7.1.1.2 System Operations and Maintenance (O&M)

As discussed in 4.3, quarterly inspections and maintenance activities at the NPL site are performed for the purpose of maintaining the integrity of the landfill cover system (i.e., vegetative cover, passive gas vents, and surface water controls) and to ensure that the LUCs are maintained as required by the Final ROD.

7.1.1.3 Opportunities for Optimization

The landfill cover system has stabilized during the past five years to a state where very little non-routine maintenance is required. Because the technology (i.e., landfill cover systems) is well understood and because potential erosion and drainage problems were addressed promptly, the cover has become a reliable low maintenance remedy with no need for optimization.

7.1.1.4 Early Indicators of Potential Issues

During this second five-year review, no potential issues with the remedy and its performance were identified. The quarterly inspections will ensure that any future issues will be promptly identified and corrected.

7.1.1.5 Implementation of Land Use Controls (LUCs)

Robins AFB maintains ownership and control of the NPL site. The LUC objective for OU1 is to protect human health and the environment by preventing direct contact with contaminated soil and solidified sludge under the engineered landfill cover. To meet this objective, the ROD required that Robins AFB implement several LUCs for OU1 including: (i) secured access gates at each entry point; (ii) signs to notify unauthorized personnel that the site is restricted; and (iii) excavation restrictions. In addition, the ROD requires that land use restrictions and a survey plat of the OU1 boundaries be included in the Base Comprehensive Plan.

Quarterly inspections are performed to confirm that the LUCs are in place. Recent inspections have not revealed any activities that were inconsistent with the LUC objectives, or any actions that may interfere with the effectiveness of the LUCs. At present, and in accordance with the imposed LUCs at the NPL site, the land will continue to be used for non-residential purposes conforming to the provisions established in the Final ROD.

7.1.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy still valid?

OU1 was defined as the LF04 and WP14 source areas. The overall cleanup strategy prescribed in the Final ROD for OU1 was in place containment and exposure controls (i.e., landfill cover system) and implementation of LUCs.

In the 1990 BRA, four human health chemicals of concerns (i.e., arsenic, cadmium, chromium, and chloroform) were identified in surface soils for OU1 as posing unacceptable risks to on-site child trespassers and off-site residents under the land use scenarios evaluated at that time (CH2MHill, 1990). The 1990 BRA found that OU1 did not pose risks to human receptors in the wetlands, and the exposure pathways based on storm water runoff from OU1 were insignificant.

The 1990 BRA also determined that there were no significant pathways for exposure of ecological receptors to contaminants in the OU1 soils. Therefore, on-site exposure pathways associated with ecological risks were considered to be incomplete, and no ecological COCs were identified for OU1 (Earth Tech, 2004).

Since the implementation of interim measures (i.e., treatment of WP14 and installation of a cover system over LF04 and WP14) in 1998, the OU1 remedy is considered to be complete and in place. The potential exposure pathways previously identified for OU1 (during the development of 1990 BRA prior to implementation of interim measures) are considered incomplete and/or insignificant, and therefore, there were no specific COCs and associated cleanup criteria established for OU1 in the Final ROD.

7.1.2.1 Changes in Standards

The remedy selected for OU1 has been in place since 1998. Because the Final ROD did not specify any COCs and associated cleanup criteria for OU1, the Applicable or Relevant and Appropriate Requirements (ARARs) for OU1 were not established; and therefore, changes in standards are not applicable.

7.1.2.2 Changes in Exposure Pathways

During this second five-year review, no new exposure pathways, contaminants, or contaminant sources associated with OU1 were identified. Continued maintenance of the landfill cover system and implementation of LUCs further ensure that potential exposure pathways to contaminants associated with OU1 remain incomplete or insignificant.

7.1.2.3 Changes in Toxicity Data and Risk Assessment Methods

Although not identified as COCs in the Final ROD, changes in toxicity criteria for arsenic, cadmium, chromium, and chloroform (identified as COCs for OU1 in the 1990 BRA) are provided in Tables 7-1 and 7-2. Changes to the oral toxicity values have been minor, while changes to the inhalation toxicity have been more substantial. For the inhalation slope factors, the changes would result in lower cancer risk estimates. For the inhalation reference doses, the changes would result in higher non-cancer risk estimates. However, because the inhalation route is not typically a major contributor to receptor risks for metals, these changes would not affect the conclusions of the 1990 BRA's human health risk evaluation. Additionally, because there are no exposure pathways under the current conditions, changes in toxicity data and risk assessment methods for OU1 are irrelevant.

7.1.2.4 Progress toward Meeting RAOs

The RAOs for OU1 are deemed to effectively protect human health and the environment from exposure to contaminants. Previous conclusions from the first five-year review and the Final ROD with regard to the protectiveness of the remedy for OU1 are still valid.

7.1.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

The application of presumptive remedies for OU1 minimizes the risk of technology failures and lack of protectiveness. The environmental conditions on and adjacent to the NPL site are unchanged. The evaluation of the RAOs, exposure assumptions, and toxicity data discussed above indicates that the remedy continues to be protective.

7.2 OU3 SITE GROUNDWATER

7.2.1 Question A: Is the remedy functioning as intended by the decision document?

The RAOs for OU3 are: (i) achieve containment and exposure control; (ii) prevent potential impact to adjacent wetlands; and (iii) restore groundwater to MCLs through construction and operation of a groundwater recovery and treatment system, as well as implementation of LUCs. The OU3 groundwater recovery and treatment system was constructed as part of the interim measures and has been operational since 1997. The details of the interim measures are described in 3.4. As discussed in 4.1 and 4.2, the Final ROD accepted these interim measures as part of the final remedy for OU3 and required that: (i) groundwater monitoring be performed on an annual basis to verify the remedial system effectiveness; (ii) continual optimization of the remedial system be performed by evaluating the system efficiency and effectiveness; (iii) LUCs be implemented to restrict access to the site (land and groundwater) for future use; and (iv) the specified O&M activities for optimum performance of the remedial system be conducted. The Final ROD also stated that, in the future with proper technical evidence, the decision to modify the site remediation approach from an active groundwater recovery system to a more cost effective MNA remedy can be made.

7.2.1.1 Remedial Action Performance

As mentioned earlier, WP14 source area remediation, started in 1995, was completed in 1996 and construction of a cover system encompassing the LF04 area (including the location of WP14) was completed in 1998 as part of the OU1 interim measures. Immediately following the implementation of OU1 interim measures, dramatic improvement in groundwater quality was noticed as shown in the time trend figures presented in Appendix F.2. The OU1 interim measures minimized source area impact to groundwater (i.e., leaching of contaminants from source areas to groundwater) by reducing the mass of VOCs. The effect of source area remediation on groundwater restoration can be observed in several monitoring wells near the WP14 area; however, the effects are most clearly seen at LF4-6. Prior to the source area remediation, natural attenuation was the sole contributor to groundwater remediation. Based on a review of the LF4-6 time trend data, the recharge rate of TCE entering groundwater was similar to the attenuation rate such that no net change in concentration could be detected over time. The source area remediation dramatically altered the equilibrium between dissolved and source area VOCs. Between 1995 and 1997, the TCE concentration in groundwater decreased by approximately 100-fold to establish a new equilibrium between groundwater and the remediated WP14 source area.

In addition to the OU1 interim measures, a groundwater recovery and treatment system (described earlier in Sections 3 and 4) was constructed and started operating in 1997 as an interim measure for OU3. Since 1997, the groundwater remediation system, coupled with remarkable impacts of the source area remediation, progressed toward restoration of the OU3 site groundwater. Based on the data review and evaluations presented in 6.4.2, the following conclusions can be made with respect to current conditions at the NPL site and OU3:

- As a result of effective remediation and natural attenuation, primary contaminants (i.e., TCE and its daughter products) are no longer detected in the surficial aquifer. Of the residual contaminants still present, benzene is the most prevalent. However, on a positive note, benzene concentrations have been decreasing with time, are contained within the landfill boundaries, and are often associated with decomposition of MSW. The remediation system and natural attenuation processes are effective in treating/containing the residual contamination in the surficial aquifer.
- A reduction in TCE contaminant mass in the alluvial aquifer continues to be evident. TCE concentrations have decreased significantly since 1997, when maximum TCE

concentrations were greater than 2,000 µg/L, to a maximum concentration of 59 µg/L in April 2005. The lateral extent of the contaminant plume has been reduced to approximately one-quarter of its 1997 extent. It is evident that the groundwater recovery and treatment system and natural attenuation processes have been effective at reducing TCE concentrations in a manner consistent with the achievement of RAOs for the site. TCE concentrations in many wells have already reached a point of asymptotic decline at or near the MCL, whereas in other wells this objective is being approached rapidly.

- There are two distinct TCE plumes at LF04. The TCE plume located in the upper Providence aquifer originated from SWMU 62/OT37 and is separate from the NPL site OU3 Quaternary alluvial groundwater plume. This conclusion is supported by decreasing concentrations at the leading edge of the SWMU 62/OT37 plume and the continued separation between the two groundwater plumes. Historically, the SWMU 62/OT37 contaminant plume has been presented as part of both the NPL site and SWMU 62/OT37 evaluations. However, it should be noted that the SWMU 62/OT37 groundwater plume is currently being remediated and managed under RCRA through the GA EPD, and is not discussed further herein.
- Due to the effectiveness of the OU3 groundwater recovery system, the organic mass removal rate has been in rapid decline since 2002, and the contaminant concentrations have reached or are rapidly approaching asymptotic levels. Low removal efficiencies are apparent by the negligible contaminant mass removed per unit volume of groundwater extracted. In 2005, an average of only 0.5 lbs of contaminants were removed per million gallons of groundwater extracted. To put this in perspective and for comparison purposes, in 2005, the NPL site recovery system contributed less than one percent of the total mass removed from all restorations sites combined that are

part of the Base's GWTS, while contributing approximately 16 percent of the total flow.

In summary, as discussed in the Data Review and Evaluation (6.4.2), the OU3 remedy is functioning as intended in the Final ROD. There have been no changes in site conditions or remedy performance that resulted in failure of the remedy specified in the Final ROD.

7.2.1.2 System Operation & Maintenance (O&M)

As discussed in 4.3, O&M activities are performed as part of the ongoing remedial measures for OU3 (i.e., groundwater recovery and treatment). These O&M activities ensure that the remediation system operates as intended and at or near optimum levels. In addition, the effectiveness of the remedial system is continually evaluated and documented in progress reports submitted to the US EPA and the GA EPD.

Ongoing maintenance of the groundwater recovery system has resulted in reliable mechanical performance. As in the past, long-term operation of the system may require occasional shut downs for repairs, equipment replacement, and optimization; however, these short-term operational interruptions are normal and routine for such systems and are a part of the O&M Manual as approved by the GA EPD.

7.2.1.3 Opportunities for Optimization

A number of RPO activities have occurred since the groundwater recovery and treatment system started operating in 1997. Over time, the following wells and leachate pump stations have been shut down with regulatory approval due to low mass removal rates as a result of successful remediation of groundwater contaminants to levels near or below MCLs: (i) RW1 (February 1999); (ii) RW2, RW3, and RW6 (May 2002); (iii) LF4PS3 (March 1999); and (iv) LF4PS1, LF4PS2, and LF4PS4 (May 2002). During 2005, Robins AFB proactively reactivated RW1 on a temporary basis due to slight rebound in contaminant concentrations (i.e., the TCE concentration at RW1 slowly increased from below the MCL in 2000 to 30 ppb in 2004). Robins AFB continues to evaluate RPO practices for the NPL site, including: (i) well rehabilitation methods; (ii) maintaining well flow rates at or near optimum levels to achieve the highest possible contaminant mass removal efficiencies; and (iii) alternative remedial approaches (e.g., MNA).

As discussed in 7.2.1.1, the groundwater recovery system efficiency (as defined by mass of contaminants removed per volume of groundwater recovered) has been in decline over the years and has passed the point of diminishing returns. From a cost-benefit perspective, in the near future, it may no longer be efficient to continue operation of the recovery wells with such low mass removals. As stated in the Final ROD, when it is determined with proper technical evidence and regulatory approval, the site remedial approach may be transitioned from groundwater recovery to MNA.

7.2.1.4 Early Indicators of Potential Issues

During this second five-year review, no potential issues with the remedy and its performance were identified. Implementation of the approved O&M Manual (site inspections, groundwater sampling, and system optimization) will continue to ensure that any future issues are promptly identified and corrected.

7.2.1.5 Implementation of Land Use Controls (LUCs)

Robins AFB maintains ownership and control of the NPL site. The LUC objective for OU3 is to protect human health and the environment by preventing direct contact with, or consumption of, contaminated groundwater (OU3) by maintaining the integrity of the engineered landfill cover and restricting access to groundwater. In order to meet this objective, the Final ROD required that Robins AFB implement several LUCs for OU3. The OU3 specific LUCs include: (i) prohibition of water supply wells within OU3; and (ii) those LUCs applicable to OU1 as discussed in 7.1.1.5.

While quarterly inspections confirm that the OU1 LUCs are in place, OU3 LUCs (i.e., institutional controls) ensure that access to groundwater is restricted. Recent site inspections and a review of land and groundwater use at the NPL site have not revealed any activities that were inconsistent with the LUC objectives, or any actions that may interfere with the effectiveness of the LUCs. At present, in accordance with the imposed LUCs that are in place at the NPL site, the land will continue to be used for non-residential purposes and the site groundwater will not be withdrawn or used for any purpose other than groundwater remediation, conforming to the provisions established in the Final ROD.

7.2.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy still valid?

OU3 was defined as the site groundwater impacted by OU1 source areas. The overall cleanup strategy prescribed in the Final ROD for OU3 was groundwater recovery and treatment, implementation of LUCs, and a pending transition to MNA, when appropriate.

As part of the remedial investigations for OU3, a BRA for OU3 was developed in 1993 (CH2MHill). A detailed summary of the 1993 OU3 BRA, including initial identifications of COCs, exposure and toxicity assessments, risk characterization methods, and conclusions were provided in the Final ROD. In addition, the Final ROD also summarized a reassessment of risks from OU3 based on the additional groundwater screening and risk evaluations performed as part of the FS completed in 1999 (Earth Tech/Rust E&I, 1999). It should be noted that, as discussed earlier, interim measures (i.e., WP14 source area remediation, LF04 and WP14 cover system, and groundwater recovery and treatment system) were implemented at the NPL site following the completion of the 1993 OU3 BRA and prior to the 1999 FS. As a result of these interim measures the site conditions were improved dramatically, and the final COCs identified by the 1999 FS (and later adapted by the Final ROD with minor modifications) were significantly reduced from the list of COCs identified by the 1993 OU3 BRA. The final OU3 COCs identified by the Final ROD for each of the surficial, Quaternary and upper Providence aquifers, as well as the corresponding cleanup criteria, are presented in Table 3-1. The cleanup criteria established in the Final ROD are based on MCLs promulgated by the federal ARARs specified below in 7.2.2.1.

Based on the 1993 OU3 BRA and the 1999 FS, the Final ROD concluded that the lower Providence and Blufftown aquifers did not contain site-related contaminants

In the 1993 OU3 BRA, it was also determined that there is no exposure of ecological receptors to site groundwater, and therefore, on-site exposure pathways associated with ecological risks were considered to be incomplete and no ecological COCs were identified.

7.2.2.1 Changes in Standards

The remedy selected for OU3 has been in place since 1997. The Final ROD specified media-specific COCs and associated cleanup criteria (i.e., MCLs) for OU3. As discussed in 6.4.2.3 and 7.2.1, based on the data collected during the 2005 basewide groundwater sampling event, although significant progress has been made, the ARARs (i.e., the Safe Drinking Water Act (SDWA) National Primary Drinking Water Regulations (40 CFR 141.11-141.16) from which the groundwater cleanup criteria were developed) have not been fully met.

At the time of the 1993 BRA report, the federal MCL for arsenic was 50 µg/L. The first five-year review completed in 2001 noted that the US EPA was in the process of revising the arsenic MCL and cited a proposed value of 5 µg/L. The Final ROD completed in 2004 also cites an arsenic MCL of 5 µg/L. However, in actuality, the most recent MCL for arsenic of 10 µg/L was promulgated on 22 January 2001 (66 Federal Register (FR) 6976). This was acknowledged in a table footnote in the First Five-Year Review Report, but not in the Final ROD. Regardless, the new arsenic MCL (10 μg/L), although more stringent than the previous standard (50 μg/L), is less stringent than the cleanup criteria specified in the Final ROD, and therefore, does not alter the protectiveness of the remedy.

7.2.2.2 Changes in Exposure Pathways

During this second five-year review, no new exposure pathways were identified for OU3. Under the current site conditions and with implementation of LUCs imposed by the Final ROD, the potential exposure pathways to contaminants associated with OU3 remain incomplete or insignificant.

A review of the most recent groundwater data (from the 2005 basewide groundwater sampling event) indicated that three chemicals not previously identified as OU3 COCs by the Final ROD were detected at concentrations exceeding the MCLs promulgated by the US EPA. These chemicals are: 1,2-dichlorobenzene, 1,4-dichlorobenzene, and mercury, all of which were only detected at only one location above their respective MCLs. 1,2-dichlorobenzene and 1,4-dichlorobenzene were detected in well LF4-6 located in the immediate vicinity of the former WP14 location. Mercury was detected in well LSB13 located at the center of LF04 at an estimated concentration of 2.3 μg/L (the detection was "J" flagged by the analytical laboratory as an estimated value), only marginally above the MCL for mercury (2.0 μg/L).

It should be noted that detections of these chemicals (at similar spatial frequency and at concentrations higher than reported in 2005) were reported in historic documents such as the 1999 FS and yet they were not identified as COCs for those reasons discussed in detail in the Final ROD. As such, and consistent with methodologies and rationale used in the 1993 OU3

BRA, the 1999 FS, and the Final ROD, these three chemicals are not considered as new COCs. Therefore, in this second five-year review, it is concluded that the protectiveness of the remedy in place for OU3 remains effective and valid.

7.2.2.3 Changes in Toxicity Data and Risk Assessment Methods

Changes in toxicity data for COCs identified in the Final ROD are provided in Table 7-3. In general, these changes are not significant and do not affect the conclusions of previous human health risk evaluations. It should be noted that the US EPA's cancer potency estimates for TCE were withdrawn by the agency in 1989. However, those values were used in the 1993 BRA and continue to be used by many states and the US EPA regions today. The potential human health risk associated with TCE is currently undergoing a reassessment by the US EPA. The agency has provided a range of new cancer potency estimates; however, none have been formally adopted. US EPA Region 9 has selected potency estimates for the purposes of calculating their preliminary remediation goals (PRGs). If the values currently being used by Region 9 are formally adopted by the US EPA for use in human health risk assessment, it would result in cancer risks associated with TCE being approximately 40-times higher when all other factors are held constant. It should also be acknowledged that the OU3 cleanup criteria established for TCE by the Final ROD defaults to the federal MCL for TCE, which remains at 5 μg/L with no indications of changes to federal standards in the immediate future. Therefore, it is anticipated that even if the new cancer potency estimates for TCE are adopted by the US EPA, the protectiveness of the OU3 remedy will not be altered, as long as the MCL for TCE remains unchanged.

7.2.2.4 Progress toward Meeting RAOs

The RAOs for OU3 are: (i) achieve containment and exposure control; (ii) prevent potential impact to adjacent wetlands; and (iii) restore groundwater to MCLs through construction and operation of a groundwater recovery and treatment system, as well as implementation of LUCs. The first two RAOs are being met, and significant progress is being made toward meeting the remedial objective of restoring groundwater to MCLs as discussed in 7.2.1.1.

7.2.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

The groundwater remedy has performed as designed and has achieved measurable improvements in groundwater quality during the past five years. No other information has become available that challenges the protectiveness of the remedy.

7.3 SUMMARY OF TECHNICAL ASSESSMENT

The assessment of the technical performance of the OU1 and OU3 remedies, which is primarily based on the results from 2005 sampling events, indicates that both systems are effectively meeting Remedial Action Objectives (RAOs) and are protective of human health and the environment. It should also be noted that the remedial system at the NPL Site has operated almost a full year since the 2005 sampling events, and therefore, the remediation progress has continued to move forward beyond the progress discussed herein. Both remedial systems have been in place long enough that they are mechanically and physically stable and reliable. No changes in the O&M program for OU1 are required to preserve the current level of performance and protectiveness. The OU3 remedy will continue to be adjusted for optimal performance, which may, with regulatory approval, include a transition to MNA in the near future.

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TABLES

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Table No. 7-1
Changes in Toxicity Data
Ingestion Values for OU1 Contaminants of Concern[1]

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Chemical	Reference Dose (Oral)		Slope Factor (Oral)	
	May 1990[2] (mg/kg-day)	March 2006[3] (mg/kg-day)	May 1990[2] $(mg/kg\text{-}day)^{-1}$	March 2006[3] $(mg/kg\text{-}day)^{-1}$
Arsenic	NC	0.0003	1.75	1.5
Cadmium	NC	NC	NC	NC
Chromium VI	0.005	0.003	NC	NC
Chloroform	--	--	NC	NC

Notes:

[1] - Contaminants of Concern (COCs) are based on 1990 Baseline Risk Assessment (CH2MHill, 1990). These COCs for OU1 were not listed in the Final ROD (Earth Tech, 2004).

[2] - May 1990 Reference Dosages and Slope Factors taken from Remedial Investigation Report for OU1 (CH2MHill, 1990).

[3] - March 2006 Reference Dosages and Slope Factors taken from Integrated Risk Management System (IRIS) (USEPA, 2006).

NC - No Criteria.

-- - No Change.

mg/kg - milligrams per kilogram.

Table No. 7-2
Changes in Toxicity Data
Inhalation Values for OU1 Contaminants of Concern

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Chemical	Reference Dose (Inhalation)		Slope Factor (Inhalation)	
	May 1990[2] (mg/kg-day)	March 2006[3] (mg/kg-day)	May 1990[2] $(mg/kg\text{-}day)^{-1}$	March 2006[3] $(mg/kg\text{-}day)^{-1}$
Arsenic	NC	NC	50	1.5
Cadmium	NC	NC	6.1	6.3
Chromium VI	NC	0.0000022	41	9.8
Chloroform	NC	0.014	--	--

Notes:

[1] - Contaminants of Concern (COCs) are based on 1990 Baselike Risk Assessment (CH2MHill, 1990). These COCs for OU1 were not listed in the Final ROD (Earth Tech, 2004).

[2] - May 1990 Reference Dosages and Slope Factors taken from Remedial Investigation Report for OU1 (CH2MHill, 1990).

[3] - March 2006 Reference Dosages and Slope Factors taken from Integrated Risk Management System (IRIS) (USEPA, 2006).

NC - No Criteria.

-- - No Change.

mg/kg - milligrams per kilogram

Table No. 7-3
Changes in Toxicity Data
Ingestion Values for OU3 Contaminants of Concern[1]

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Chemical	Reference Dose (Oral)		Slope Factor (Oral)	
	September 1993[2] (mg/kg-day)	March 2006[3] (mg/kg-day)	September 1993[2] $(mg/kg\text{-}day)^{-1}$	March 2006[3] $(mg/kg\text{-}day)^{-1}$
Arsenic	NC	0.0003	1.75	1.5
Chromium VI	NC	0.003	NC	NC
Benzene	NC	0.0004	0.029	0.055
PCE	--	--	0.052	0.54
TCE	0.006	0.0003	0.011	--[4]
Vinyl chloride	NC	0.003	1.9	1.5

Notes:

[1] - Contaminants of Concern are based on Final ROD (Earth Tech, 2004).

[2] - September 2003 Reference Dosages and Slope Factors taken from Remedial Investigation Report for OU3 (CH2MHill, 1993).

[3] - March 2006 Reference Dosages and Slope Factors taken from Integrated Risk Management System (IRIS) (USEPA, 2006).

[4] - See text regarding cancer potency estimates for TCE.

NC - No Criteria.

-- - No Change.

mg/kg - milligrams per kilogram.

8.0 ISSUES

The excellent performance of the OU1 remedy requires only the continuation of routine inspections and O&M. No technical issues affecting the performance of the OU1 remedy were identified.

Similarly, the OU3 remedy has been very effective in achieving the RAOs identified in the Final ROD and has performed as designed. No technical issues affecting the performance of the OU3 remedy were identified. In fact, the OU3 remedy has passed the point of diminishing return due to significantly decreasing contaminant concentrations in groundwater. As a result, as stated in the Final ROD, OU3 will be eventually be transitioned to MNA. This will not affect the protectiveness of the remedy.

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9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Because of the exceptional performance of the remedies implemented at the NPL site and the adherence to Final ROD requirements, no issues were identified during this second five-year review process requiring follow-up actions.

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10.0 PROTECTIVENESS STATEMENTS

10.1 PROTECTIVENESS STATEMENT FOR OU1

The remedy at OU1 is protective of human health and the environment. Potential exposure pathways that could result in an unacceptable risk are being controlled by the landfill cover system and through implementation of LUCs.

10.2 PROTECTIVENESS STATEMENT FOR OU3

The remedy for OU3 is protective of human health and the environment. Potential exposure pathways that could result in an unacceptable risk are being controlled through implementation of LUCs. Contaminant concentrations in groundwater near the source area have reached a point of asymptotic decline at or near the MCLs. Furthermore, LUCs prohibit drinking or potable water supply wells at the NPL site.

10.3 COMPREHENSIVE PROTECTIVENESS STATEMENT

Overall the remedial actions at the NPL site are protective of human health and the environment.

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11.0 NEXT REVIEW

The NPL site is a statutory site requiring ongoing five-year reviews. The third five-year review for the NPL site is scheduled for completion in July 2011, five years from the date of this review.

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12.0 REFERENCES

Code of Federal Regulations (CFR), Title 40, Parts 141 and 300.

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APPENDIX A

Photographic Documentation of Surface Erosion Restoration Activities (2003 & 2004)

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2003 2004

Photo No. 1

Eroded Area at the Diversion Ditch – West Side

2003 2004

Photo No. 2

Eroded Area at the Diversion Ditch – East Side

2003 2004

Photo No. 3

Repair of Larger Bare Area – Central Landfill

2003 Photo No. 4 2004

Repair of Larger Bare Area – Central Landfill

2003 Photo No. 5 2004

Eroded Area Repair – Near North Entrance

2003 Photo No. 6 2004

Eroded Area Repair – Near North Entrance

2003 Photo No. 7 2004

Rip Rap Placement - Landfill at the Wetlands

2003 Photo No. 8 2004

Rip Rap Placement - Landfill at the Wetlands

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APPENDIX B

Community Notification

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Appendix B.1

Excerpt from January 2006 Restoration Advisory Board (RAB) Presentation

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LANDFILL NO. 4 (LF04) UPDATE

- 45-acre landfill operated from 1965 to 1978
- Groundwater impacted by releases from LF04
  - VOCs and Metals
- Source area remediation completed in 1995

LANDFILL NO. 4 (LF04) UPDATE

- **Landfill cover and gas collection system installed in 1998**
- **Groundwater remediation**
  - Groundwater and leachate recovery system installed in 1997
    - Six groundwater extraction wells
    - Currently operating only two wells

LANDFILL NO. 4 (LF04) UPDATE

- **First Five-Year Review finalized March 2001**
  - Interim ROD
- **Final ROD signed September 2004**
- **Next Five-Year Review process initiated**
  - Evaluate performance of remedy in place for protectiveness of human health and environment
  - Schedule to complete June 2006

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Appendix B.2

January 2006 Restoration Advisory Board (RAB) Fact Sheet

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Robins Air Force Base Restoration Advisory Board (RAB) *Fact Sheet*

A publication of Robins AFB

Volume 8, Issue 4, January 2006

The Robins AFB RAB

Recognizing the importance of public involvement in environmental restoration, Robins Air Force Base (AFB) has established the Restoration Advisory Board (RAB). The mission of the RAB is to encourage community participation in the Air Force Environmental Restoration Program (ERP) cleanup process and allow community members and other stakeholders to have meaningful dialog with Base officials. The RAB includes members from the community, regulatory agencies, and the Base, and holds four public forums per year. The RAB serves to advise Robins AFB management and disseminate information to the public.

Inside this issue…

January 2006 RAB Meeting

The winter meeting of the RAB was held on January 12, 2006, at Centerville City Hall, Centerville, Georgia. The theme of this meeting was "Projects of Community Interest." Briefing topics were, "Introduction to CEV-APTO Partnership", "APTO Overview", "APTO Fuel Cell Summary", "JP8 Pipeline Release Corrective Action", and "Environmental Restoration Program Update."

This RAB *Fact Sheet* provides a summary of the information and topics discussed in the meeting.

The next meeting will be held on March 9, 2006.

ERP Update Briefed at January Meeting

Mr. Fred Otto, Restoration Program Manager, briefed the ERP Update at the January 2006 RAB meeting. While significant progress is being seen at all active sites and through operations at the GWTP, Mr. Otto focused the briefing on three sites of current community interest.

Three sites of community interest were briefed by Mr. Fred Otto. The Horse Pasture site is undergoing remediation, with soil remediation complete and groundwater remediation ongoing. At Landfill No. 4, a five-year ROD review is underway with completion scheduled for June 2006. At Luna Lake, an overflow drain failed, allowing the lake to drain in approximately three days. At present options for upgrading Luna Lake prior to refilling are being evaluated. The close proximity of Landfill No. 3 and ongoing RPO activities there are factors being included in options evaluations.

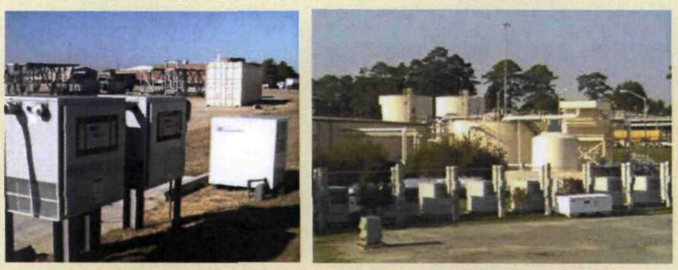
At the Horse Pasture site, a number of achievements have occurred since the previous RAB briefing of January 2005. Among these are GA EPD approval of the site's Final Corrective Action Plan and approval of NFA status on soil SWMUs. The soil remediation activities have resulted in a 50 percent reduction in the remaining groundwater contamination levels.

(Continued on page 4)

Environmental Management Partnership with APTO is "Power-full" Alliance

Mr. Dave Bury, Pollution Prevention Program Manager, introduced an ongoing successful partnership involving Environmental Management and APTO. He commented that a past teaming involving the two resulted in development and deployment of rapid battery chargers at key locations on Base, making the widespread use of electric vehicles on Base more feasible.

Mr. Michael Mead of APTO provided an overview of APTO. APTO's mission is to lead and manage

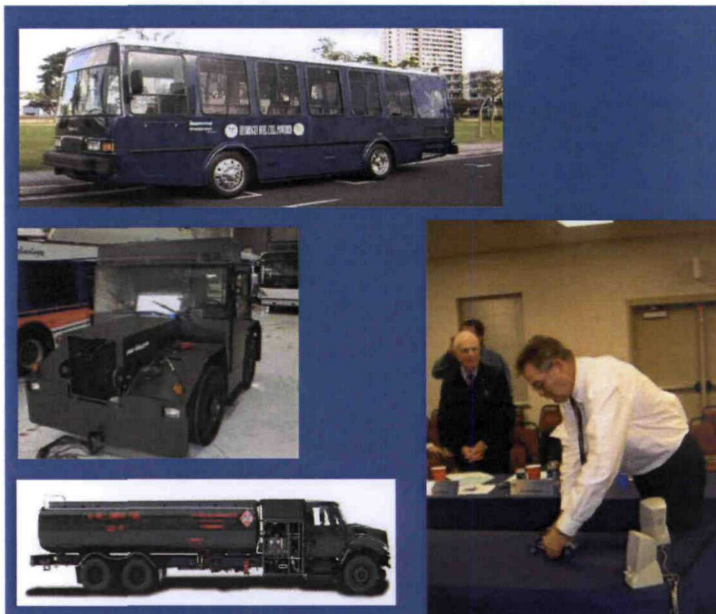


APTO collaboration with Environmental Management has included development and deployment of rapid battery chargers at locations across the Base (left) and implementation of the fuel cell micro-grid at the GWTP (right)

advanced power technologies in support of the warfighter. Advanced power technologies include hybrid/electric drive systems, renewable energy (solar, wind, landfill gases, water, and biomass), hydrogen generation systems, fuel cells, and distributive power technologies.

Current focus areas include development of field multi-task capable equipment, reduction in airlift and logistic support requirements, creation of joint advanced power initiatives, sharing and transfer of capabilities to Homeland Defense, provision of dual use (commercial/military) capability, and meeting of environmental policy requirements. Mr. Mead mentioned several examples of APTO projects. In addition to the Robins AFB fuel cell micro-grid, active projects include hydrogen fuel cell vehicles and infrastructure (Hickam AFB and Selfridge ANGB), heavy duty hybrid electric systems (military refueling truck), and common core power production.

Mr. Robert David of APTO presented a summary of fuel cell technology. He described several types of fuel cells, but focused attention on the PEM type as the one in most active development. Fuel cell benefits include high efficiency and environmentally friendly nature, but disadvantages include high cost and short life cycle. However, Mr. David used the analogy of video camera development to emphasize that, as the technology matures and the manufacturing infrastructure is put in place, costs are expected to drop dramatically.



Fuel cell vehicles of several types were discussed, including a bus in use at Hickam AFB (top), a tow truck (middle left), and a military refueling truck (lower left). Mr. Roy Case demonstrated a fully operational fuel cell "model car" (lower right)

Mr. David discussed the partnership between APTO and Environmental Management related to the GWTP fuel cell micro-grid. Environmental Management provided the site and support infrastructure for the project, and APTO provided program management and oversight. The micro-grid extracts hydrogen from LPG to fuel the PEM fuel cells and converts the DC power to AC for introduction to the Base grid. During the year-long test, more than 275,000 kilowatt-hours will be generated. The test will provide data to determine if deployed systems are suitable for warfighter needs, and to determine if such a system can supply back-up power for DoD installations.

Corrective Action for JP8 Pipeline Release Underway

Mr. Scott Harris of CAPE summarized the corrective action implementation underway at the JP8 pipeline fuel release site. This site, located east of Taxiway "Echo" and near Beale Drive, includes an area of fuel release from a fuel pipeline detected in 2002 during a transition from JP4 to JP8 fuel. Overall project objectives include clean-up of the fuel release, meeting of all Corrective Action Plan goals, restoration of the site to existing conditions, and accomplishment of these objectives with no impact to Base mission.

This photo of the construction area for the JP8 fuel release remediation shows the proximity of both flightline operations and vehicular traffic, both of which require special care in planning and conducting the excavation

The corrective action goals for the site are to remove free product, remediate groundwater to drinking water standards, and remediate soil that is above threshold levels. The corrective action involves four distinct steps, including excavation of contaminated soils, removal of free product and contaminated water, placement of specially adsorbent material, and monitoring of groundwater. Excavation will involve retention of the top two feet of soil, with removal of one acre of soil down to the water table while meeting shoring requirements, followed by backfill with clean soil. The stockpiled non-hazardous contaminated soil, totaling approximately 6,500 cubic yards, will be disposed off Base in approximately 500 truckloads.

The special adsorbent material, POL Sorb, is an activated peat moss designed to adsorb fuel and biodegrade the adsorbed materials. At this site, the material will be installed as a barrier wall at the base of the excavation layer.

This site poses special challenges. Numerous underground utilities are present in the excavation area, and must be accommodated during the operation. Flightline operations routinely occur nearby, with the excavation area expected to extend very near Taxiway "Echo". Excavation safety is a key issue, especially with the limited working area and the planned depth of the excavation. Finally, soil handling and transport is a topic of interest, since a significant number of truckloads of soil will be filled and will move both on the installation and through the local community.

The schedule of activities is as follows. Utilities relocation is scheduled for late January, with decommissioning of monitoring wells following in early February. Excavation is scheduled for late February through April, with new well installation and site restoration planned for May.

Special excavation techniques such as soil benching are planned for the excavation portion of the JP8 fuel release remediation project. These techniques are employed to ensure safety and to prevent cave-ins. Here a similar operation is underway at a site in New York state

(Continued from page 1)

In addition, during 2005 the groundwater treatability pilot test was completed, following which two full-scale chemical injections into the groundwater plume occurred. Remaining tasks related to the Horse Pasture site include completion of annual reports to GA EPD, continuation of groundwater remediation through at least 2006, review of the level of MNA occurring at the site, and submittal of the NFA document by 2008.

Options for upgrade of Luna Lake prior to refilling include recontouring of the bottom and sides to enhance fishery

At Landfill No. 4, operated from 1965 through 1978, groundwater was impacted by VOCs and metals. Source area remediation was completed in 1995, with later installation of a landfill cover, gas collection system, and groundwater and leachate recovery system.

A five-year ROD review based on the Interim ROD was finalized in March 2001. The next five-year ROD review has been initiated, and is to be completed by June 2006.

The third site briefed by Mr. Otto was Luna Lake. In November 2005 an overflow drain failed, allowing Luna Lake to drain in approximately three days. Presently the Base is evaluating options to upgrade Luna Lake, in addition to replacing or repairing the overflow drain. These options include possible recontouring of the lake bottom and side slopes to enhance fishery. In addition, the potential effects of lake repair options on the ongoing RPO efforts at nearby Landfill 3 are being evaluated.

Glossary

AC, DC	Alternating current; direct current
ANGB	Air National Guard Base
APTO	Advanced Power Technology Office
CEV	Environmental Management Division of the Civil Engineer Group
DoD	Department of Defense
EA	Environmental Assessment
ERP	Environmental Restoration Program
GA EPD	Georgia Environmental Protection Division
GWTP	Groundwater Treatment Plant
JP4, JP8	Jet Propellant, Types 4 and 8
LPG	Liquefied Petroleum Gas
MNA	Monitored Natural Attenuation
NFA	No Further Action
PEM	Proton Exchange Membrane
RAB	Restoration Advisory Board
ROD	Record of Decision
RPO	Remedial Process Optimization
SWMU	Solid Waste Management Unit
VOC	Volatile Organic Compound

For more information regarding the RAB, contact
Ms. Charline Logue,
Robins AFB RAB Manager, at (478) 926-1197, ext. 128
or www.robins.af.mil/em/RAB/RABmain.htm

Restoration Advisory Board Members

Mr. Steven Coyle, **Robins AFB** Installation Co-Chair	**Dr. Dan Callahan,** **Warner Robins** Community Member	**Mr. Mike Maffeo,** **Macon** Community Member
Mr. James Harden, **Warner Robins** Community Co-Chair	**Ms. Marianne Golmitz,** **Warner Robins** Community Member	**Dr. M.B. Neace,** **Macon** Community Member
Dr. Dann Spariosu, **U.S. EPA Region 4** Federal Facility, Hazardous Waste Div.	**Mr. John Harley,** **Centerville** Community Member	**Dr. Brian E. Rood,** **Macon** Community Member
Ms. Mary Brown, **GA EPD** Hazardous Waste Management	**Dr. Joyce Jenkins,** **Fort Valley** Community Member	**Dr. Linda Smyth,** **Macon** Community Member
Mr. Fred Hursey, **Robins AFB** Chief, Programming Branch	**Mr. Steve Johnson,** **Macon** Community Member	**Dr. Joseph Swartwout,** **Fort Valley** Community Member
	Mr. Broderick Lowe, **Warner Robins** Community Member	**Mr. Don Thompson,** **Macon** Community Member

Appendix B.3

Excerpt from June 2006 Restoration Advisory Board (RAB) Presentation

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NPL Site
Five-Year Review

Mr. Jimmy Whitmer

GeoSyntec Consultants

June 8, 2006

OVERVIEW

- Site background
- Purpose
- Schedule
- Review process
- Results
- Summary

SITE BACKGROUND

Site Location

SITE BACKGROUND

- **LF04 - 45-acre landfill**
  - Operated 1965 to 1978
  - General refuse and industrial waste

Landfill No. 4 (LF04) Aerial View (2005)

- **WP-14 - 1.5-acre sludge lagoon**
  - Operated 1962 to 1978
  - Industrial waste treatment plant sludge

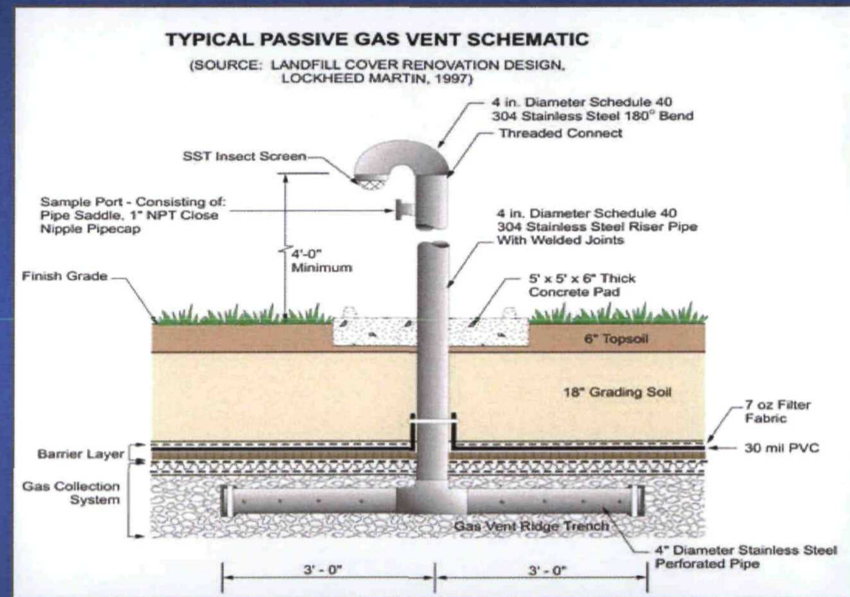
SITE BACKGROUND

- **Groundwater impacted by releases from LF04 and sludge lagoon**
  - VOCs and metals
- **Site added to National Priorities List (NPL) in 1987**
- **Only NPL site at the Base**

Landfill No. 4 Site, 2005

SITE BACKGROUND

- **LF04 and Sludge Lagoon Source Area Remediation System**
  - Sludge lagoon treatment (1996)
    - In-situ volatilization
    - Excavation and solidification
    - Replacement
  - Geocomposite cover system and passive landfill gas ventilation system (1998)
  - Land use controls



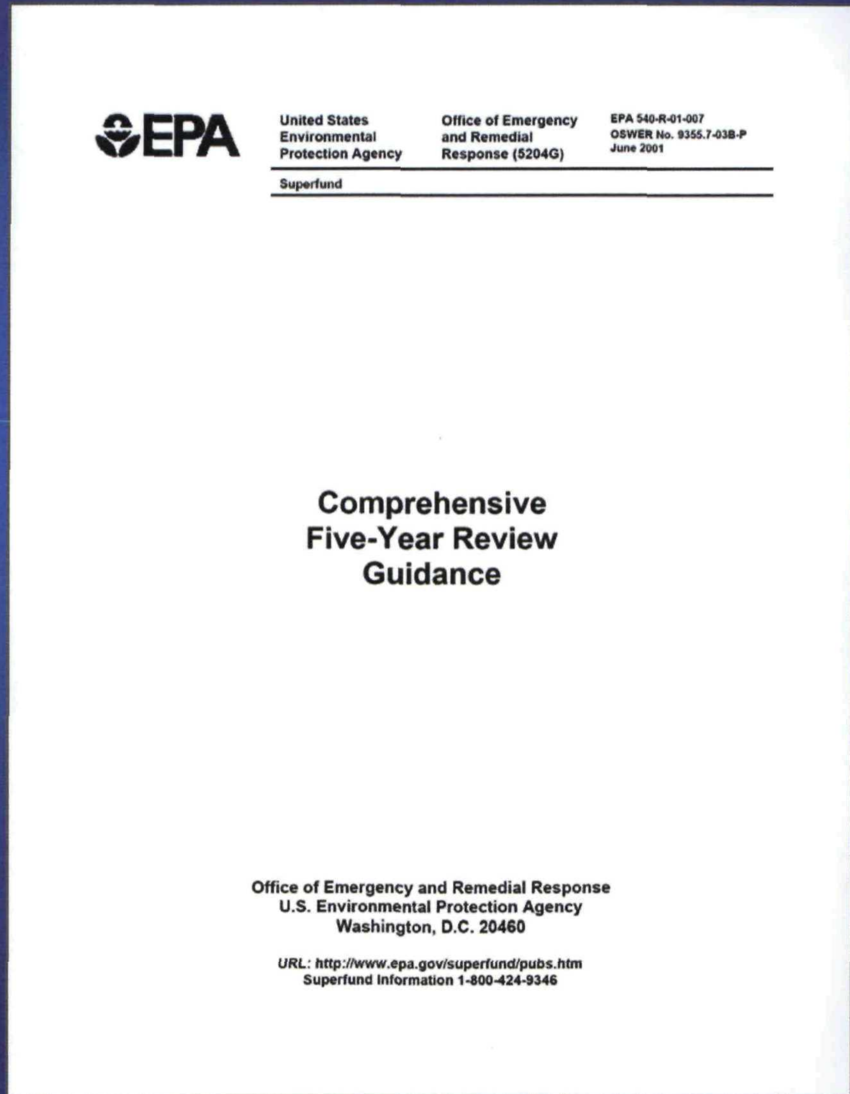
SITE BACKGROUND

- **Site Groundwater Remediation System**
  - Containment and mass removal via recovery wells (1997)
    - Six recovery wells installed
    - Currently two recovery wells are active
  - Treatment of recovered groundwater/leachate at the GWTP

Groundwater Treatment Plant (GWTP)

PURPOSE OF FIVE-YEAR REVIEW

- **Comprehensive Five-Year Review Guidance**
  - Evaluate performance of the remedy
  - Determine if the remedy is protective of human health and the environment



EPA

United States Environmental Protection Agency

Office of Emergency and Remedial Response (5204G)

EPA 540-R-01-007
OSWER No. 9355.7-03B-P
June 2001

Superfund

Comprehensive Five-Year Review Guidance

Office of Emergency and Remedial Response
U.S. Environmental Protection Agency
Washington, D.C. 20460

URL: http://www.epa.gov/superfund/pubs.htm
Superfund Information 1-800-424-9346

FIVE-YEAR REVIEW SCHEDULE

- **First Five-Year Review - March 2001**
- **Final ROD - September 2004**
- **Second Five-Year Review**
  - Initiated November 2005
  - Scheduled to be completed June 2006

Five-Year Review Report

First Five-Year Review Report
for
NPL Site
Robins AFB
Houston County, Georgia

March 2001

ENVIRONMENTAL MANAGEMENT
ROBINS AFB

Final

SECOND FIVE-YEAR REVIEW REPORT
FOR THE NATIONAL PRIORITIES LIST (NPL) SITE
OPERABLE UNITS (OUs) 1 AND 3
ROBINS AIR FORCE BASE, GEORGIA

78 CEG/CEV
Robins Air Force Base, Georgia

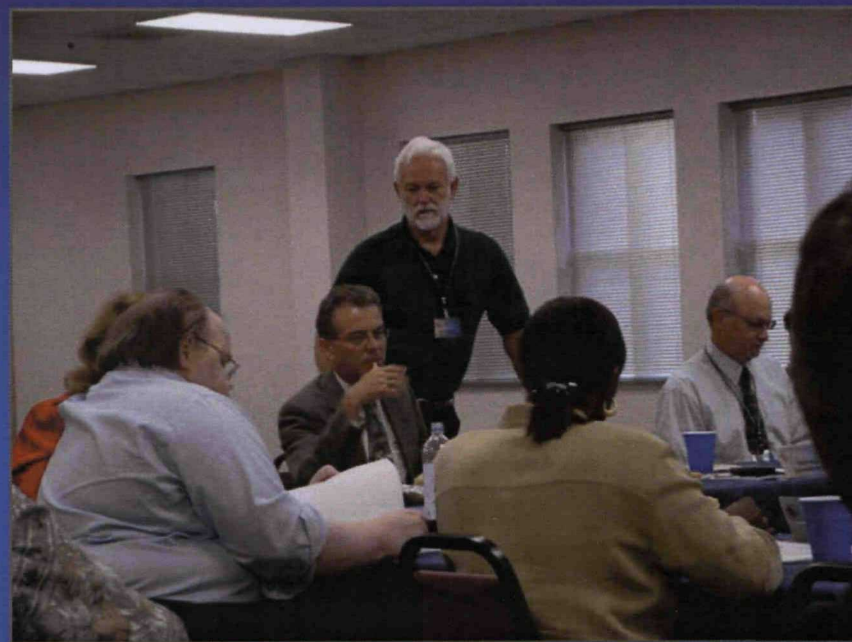
June 2006

FIVE-YEAR REVIEW PROCESS

- Establish a review team
- Notification of Five-Year Review initiation
- Perform site inspection
- Conduct technical assessment and reporting
- Notification of Five-Year Review results

FIVE-YEAR REVIEW PROCESS

- **Review team**
  - Robins AFB
  - US EPA Region IV
  - GA EPD



RAB Meeting with Community Members

- **Notification of initiation**
  - Community Relations Plan (copy at Nola Brantley Memorial Library)
  - January 2006 RAB

FIVE-YEAR REVIEW PROCESS

- **Site inspection**
  - Quarterly inspections and reporting by Robins AFB
  - Inspection by US EPA and GA EPD on March 9, 2006
- **Technical assessment and reporting**
  - Draft report submitted to and approved by US EPA and GA EPD in May 2006
- **Notification of results**
  - June 2006 RAB

RESULTS: LF04 & SLUDGE LAGOON SOURCE AREAS

- **Remedial Action Objectives**
  - Containment
    - Achieved
  - Exposure control
    - Achieved

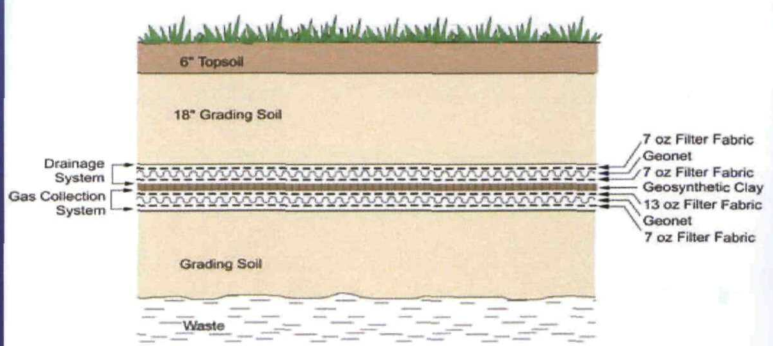
Security Gate at Landfill No. 4

RESULTS: LF04 & SLUDGE LAGOON SOURCE AREAS

- **Protectiveness Statement**
  - Remedy is protective of human health and the environment
  - Potential exposure pathways controlled by the landfill cover system and implementation of land use controls

Landfill No. 4 Area, 2005

Typical Landfill No. 4 and Sludge Lagoon Capping System

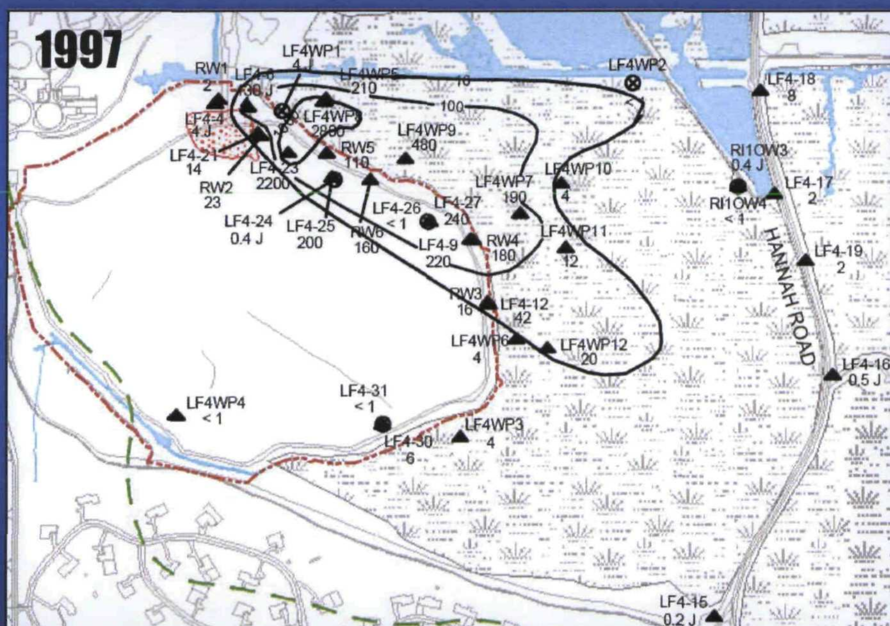


RESULTS: GROUNDWATER

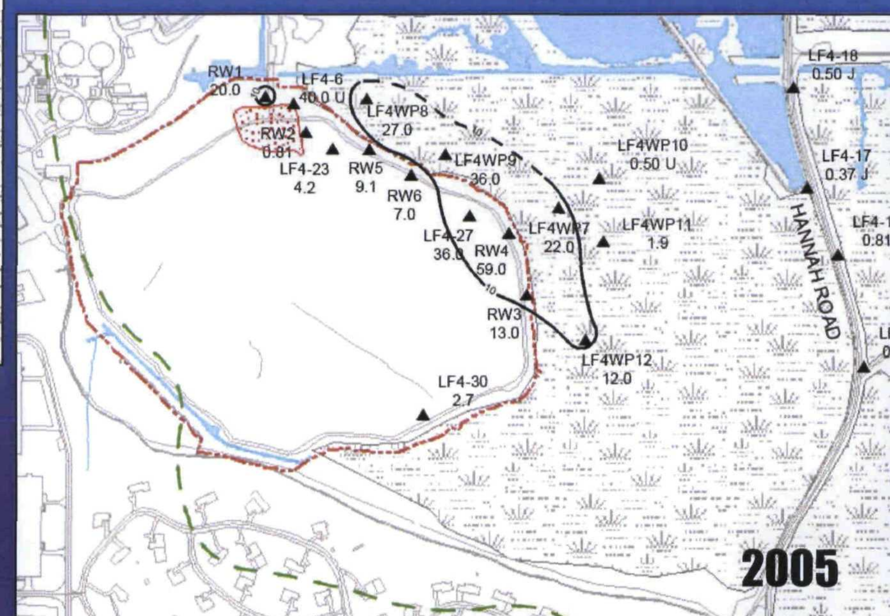
- **Remedial Action Objectives**
  - Containment and exposure control
    - Achieved
  - Prevent impact to wetlands
    - Achieved
  - Restore groundwater to MCLs
    - Nearly achieved – major progress made

RESULTS: GROUNDWATER

TCE Groundwater Plume – 1997 vs. 2005



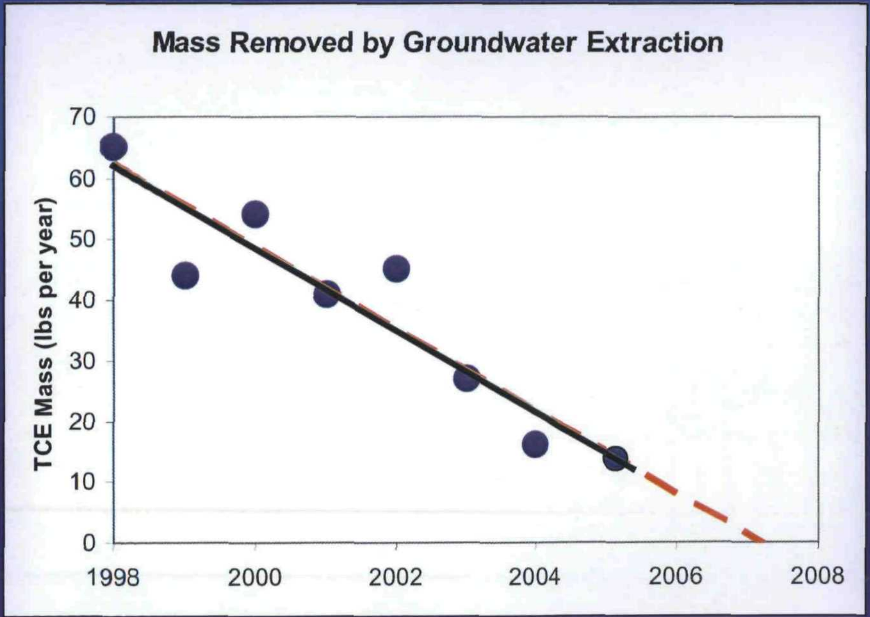
- **1997**
  - Maximum concentration: greater than 2,000 µg/L

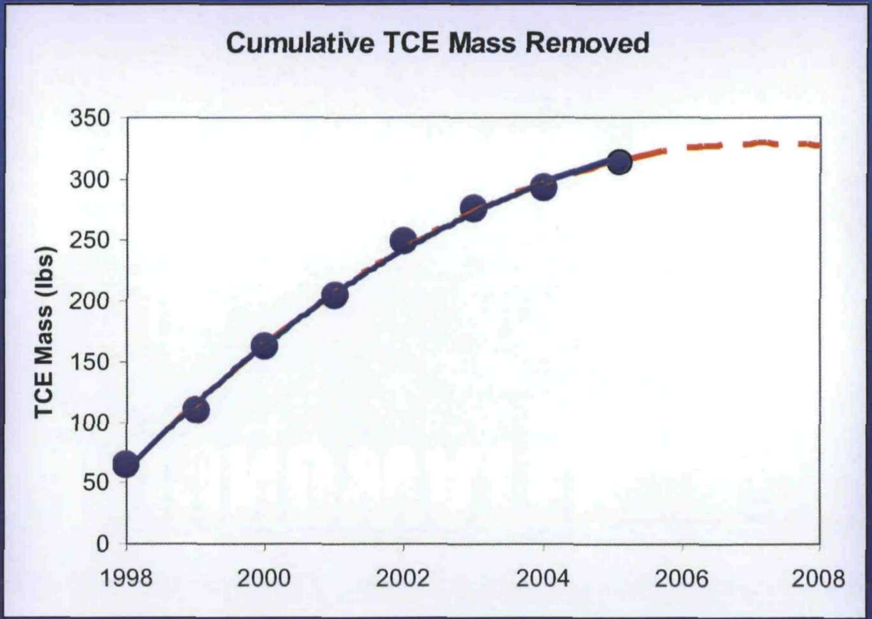


- **2005**
  - Maximum concentration: less than 60 µg/L

RESULTS: GROUNDWATER

- **Mass Removal**
  - Significant decline in mass removal rates and groundwater concentrations
  - Groundwater recovery system has passed the point of diminishing returns





RESULTS: GROUNDWATER

- **Protectiveness Statement**
  - Remedy is protective of human health and the environment
  - Potential exposure pathways controlled by the implementation of land use controls
  - Contaminant concentrations near source area are in asymptotic decline at or near MCLs

SUMMARY

- **Remedial actions protective of human health and the environment**
- **Final Five-Year Review Report available at Nola Brantley Memorial Library – July 2006**
- **Robins Air Force Base Point of Contact:**
  - Mr. Fred Otto (478) 926-1197 ext. 146
- **Next five-year review scheduled for June 2011**

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APPENDIX C

Summary of Quarterly Gas Vent Readings (2001 through 2005)

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Table No. C-1
Summary of Quarterly Gas Vent Readings (2001 through 2005)

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

LANDFILL GAS VENT READINGS
METHANE (% BY VOLUME)

AREA 1

Year	Quarter	LF4GV16	LF4GV17	LF4GV18	LF4GV19	LF4GV20	LF4GV21	LF4GV22	LF4GV23	LF4GV24	LF4GV25	LF4GV33	LF4GV34	Area 1 Average
Year 2001	2001 1st Qtr	0	0	14	44	0	30	0	0	20	0	10	0	10
	2001 2nd Qtr	14	18	24	34	6	22	1	24	30	0	15	10	17
	2001 3rd Qtr	12	30	8	8	17	6	0	10	4	0	3	0	8
	2001 4th Qtr	0	6	26	12	34	0	0	24	31	0	0	25	13
	2001 Average	7	14	18	25	14	15	0	15	21	0	7	9	12
Year 2002	2002 1st Qtr	0	1	46	46	0	20	0	16	28	0	24	9	16
	2002 2nd Qtr	3	1	0	1	3	1	2	0	16	0	4	0	3
	2002 3rd Qtr	10	36	36	12	30	22	0	10	28	0	1	10	16
	2002 4th Qtr	18	16	32	32	24	16	2	12	8	0	1	18	15
	2002 Average	8	14	29	23	14	15	1	10	20	0	8	9	12
Year 2003	2003 1st Qtr	0	60	66	72	0	52	0	0	21	0	10	0	23
	2003 2nd Qtr	0	0	38	26	0	18	0	0	26	0	0	0	9
	2003 3rd Qtr	31	44	17	41	32	37	10	28	27	2	1	21	24
	2003 4th Qtr	0	7	52	51	0	27	0	6	20	0	42	0	17
	2003 Average	8	28	43	48	8	34	3	9	24	1	13	5	18
Year 2004	2004 1st Qtr	0	0	33	45	22	18	0	0	7	0	11	0	11
	2004 2nd Qtr	0	13	1	21	12	14	4	1	1	0	10	1	7
	2004 3rd Qtr	0	17	45	54	38	24	0	0	25	0	13	0	18
	2004 4th Qtr	0	44	24	32	33	19	0	0	13	0	17	0	15
	2004 Average	0	19	26	38	26	19	1	0	12	0	13	0	13
Year 2005	2005 1st Qtr	0	0	53	60	0	18	0	21	0	0	32	0	15
	2005 2nd Qtr	0	33	48	50	49	30	0	3	27	0	29	0	22
	2005 3rd Qtr	0	17	0	21	45	12	16	1	6	0	7	0	10
	2005 4th Qtr	0	0	26	41	0	30	0	0	9	0	22	0	11
	2005 Average	0	12	32	43	24	22	4	6	10	0	22	0	15

AREA 2

Quarter	LF4GV8	LF4GV9	LF4GV10	LF4GV11	LF4GV12	LF4GV13	LF4GV14	LF4GV15	LF4GV26	LF4GV27	LF4GV28	Area 2 Average
2001 1st Qtr	0	44	22	13	4	18	0	25	0	26	0	14
2001 2nd Qtr	12	36	30	18	0	20	0	20	14	24	26	18
2001 3rd Qtr	0	11	0	13	0	1	4	11	0	14	22	7
2001 4th Qtr	0	0	0	0	0	0	0	24	0	27	10	6
2001 Average	3	23	13	11	1	10	1	20	4	23	15	11
2002 1st Qtr	0	2	46	28	28	18	0	46	0	3	38	19
2002 2nd Qtr	0	4	3	1	0	0	0	1	0	2	3	1
2002 3rd Qtr	28	34	18	8	0	18	0	20	4	22	32	17
2002 4th Qtr	18	40	36	16	3	28	28	42	14	36	42	28
2002 Average	12	20	26	13	8	16	7	27	5	16	29	16
2003 1st Qtr	0	69	69	0	0	0	0	66	0	55	64	29
2003 2nd Qtr	0	53	54	0	0	0	0	12	0	32	0	14
2003 3rd Qtr	30	51	47	30	0	15	12	39	6	28	51	28
2003 4th Qtr	0	57	58	0	0	40	0	56	0	33	34	25
2003 Average	8	58	57	8	0	14	3	43	2	37	37	24
2004 1st Qtr	0	60	47	0	0	36	0	45	0	32	26	22
2004 2nd Qtr	8	34	19	4	0	0	19	26	0	0	37	13
2004 3rd Qtr	0	59	54	0	0	0	0	51	0	27	56	22
2004 4th Qtr	0	64	59	0	0	0	0	21	0	30	55	21
2004 Average	2	54	45	1	0	9	5	36	0	22	44	20
2005 1st Qtr	0	56	56	0	0	0	0	56	0	44	57	24
2005 2nd Qtr	0	51	50	0	0	0	0	44	0	30	48	20
2005 3rd Qtr	21	44	7	2	0	0	21	35	0	0	37	15
2005 4th Qtr	26	45	34	0	0	0	0	35	0	19	42	18
2005 Average	12	49	37	1	0	0	5	43	0	23	46	20

AREA 3

Quarter	LF4GV1	LF4GV2	LF4GV3	LF4GV4	LF4GV5	LF4GV6	LF4GV7	LF4GV29	LF4GV30	LF4GV31	LF4GV32	LF4GV35	LF4GV36	Area 3 Average	LF04 Average
2001 1st Qtr	13	8	16	36	22	20	18	0	41	0	0	0	0	13	12
2001 2nd Qtr	22	20	24	4	5	25	34	24	36	0	0	24	0	17	17
2001 3rd Qtr	21	18	19	0	12	26	18	26	34	0	3	8	35	17	11
2001 4th Qtr	0	0	0	0	0	0	0	0	40	0	0	0	0	3	7
2001 Average	14	12	15	10	10	18	18	13	38	0	1	8	9	13	12
2002 1st Qtr	22	17	35	0	40	22	40	5	2	0	0	0	0	14	16
2002 2nd Qtr	20	18	38	0	2	5	2	3	18	5	3	5	4	9	4
2002 3rd Qtr	10	2	36	18	14	32	10	28	22	0	0	0	0	13	15
2002 4th Qtr	16	26	18	18	6	38	32	46	36	3	10	0	0	19	21
2002 Average	17	16	32	9	16	24	21	21	20	2	3	1	1	14	14
2003 1st Qtr	39	40	59	1	59	65	70	54	68	0	0	0	0	35	29
2003 2nd Qtr	30	38	46	0	40	12	23	31	54	0	0	0	0	21	15
2003 3rd Qtr	22	32	43	20	25	51	29	43	51	0	11	0	46	29	27
2003 4th Qtr	39	49	0	0	56	30	49	28	54	0	0	0	0	23	22
2003 Average	33	40	37	5	45	40	43	39	57	0	3	0	12	27	23
2004 1st Qtr	37	25	9	3	41	18	34	27	57	0	0	0	0	19	18
2004 2nd Qtr	12	13	9	0	20	5	16	22	24	0	0	0	43	13	11
2004 3rd Qtr	28	41	52	7	56	21	37	23	57	0	0	0	0	25	22
2004 4th Qtr	28	25	58	7	48	43	40	53	61	0	0	0	0	28	21
2004 Average	26	26	32	4	41	22	32	31	50	0	0	0	11	21	18
2005 1st Qtr	44	0	0	0	57	46	58	55	55	0	0	0	0	24	21
2005 2nd Qtr	43	45	50	0	44	52	52	43	48	0	0	0	0	29	24
2005 3rd Qtr	29	0	54	1	3	1	22	29	51	0	0	1	52	19	15
2005 4th Qtr	32	16	42	5	31	27	41	26	43	0	0	0	0	20	16
2005 Average	37	15	36	2	34	31	43	38	49	0	0	0	13	23	19

Year and Quarter	Rainfall (inches)
2001 1st Qtr	13
2001 2nd Qtr	14
2001 3rd Qtr	9
2001 4th Qtr	5
2001 Total	42
2002 1st Qtr	12
2002 2nd Qtr	8
2002 3rd Qtr	12
2002 4th Qtr	14
2002 Total	47
2003 1st Qtr	13
2003 2nd Qtr	21
2003 3rd Qtr	14
2003 4th Qtr	7
2003 Total	56
2004 1st Qtr	8
2004 2nd Qtr	9
2004 3rd Qtr	23
2004 4th Qtr	6
2004 Total	45
2005 1st Qtr	17
2005 2nd Qtr	15
2005 3rd Qtr	8
2005 4th Qtr	7
2005 Total	46

Notes: Rainfall values are based on the climatology data presented at Robins Air Force Base official website (http://www.robins.af.mil/oss/climo.htm)
Reported data is rounded to two significant digits.
Average methane concentrations represent an average of measured readings from all the gas vents within the area or at the site and not a weighted average, since no gas volumes per unit time were measured.

APPENDIX D

Inspection Photographs, Second Quarter 2005
(June 21, 2005)

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Photo No. 1
Northwest view from LF4GV10

Photo No. 2
East view from LF4GV10

Photo No. 3
South view from LF4GV10

Photo No. 4
View of southwest drainage basin

Photo No. 5
South slope facing LF4GV19

Photo No. 6
North view from the center of the landfill at LF4GV16

Photo No. 7
East view from the center of the landfill at LF4GV16

Photo No. 8
East view from the center of the landfill at LF4GV28

Photo No. 9
View of north slope from LF4GV36

Photo No. 10
View of north drainage basin northeast of LF4GV3

Photo No. 11
View of slope facing LF4GV12

Photo No. 12
View of slope facing LF4GV19

Photo No. 13
View of southeast slope facing LF4GV19

Photo No. 14
East slope of landfill east of LF4GV20

Photo No. 15
View of north slope adjacent to LF4GV1 and facing LF4GV2

APPENDIX E

Land Use Controls (LUCs) Photographic Documentation

(2005)

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Photo No. 1
Double Gate with Lock and Sign at Decon-Pad 3

Photo No. 2
Double Gate North of LF04 at Decon-Pad 3

Photo No. 3
Fence and Secured Gate with Sign by Golf Course on Hannah Drive

Photo No. 4
Fence and Secured Gate with Sign Southwest of LF04 behind Warehouse and Base Housing

Photo No. 5
Double Entry Gate with Lock and Sign West of LF04

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APPENDIX F

Statistical Trend Analyses

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Appendix F.1

Statistical Trend Analyses – Methodology

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APPENDIX F1

STATISTICAL TREND ANALYSIS

F1.1 INTRODUCTION

An objective of many environmental monitoring programs is to evaluate whether there are changes or trends in chemical concentrations over time. While increasing trends can be attributed to adverse conditions (e.g., chemical releases, continuous source, chemical transport, inadequate or no corrective action), decreasing trends typically indicate declining chemical concentrations resulting from effective corrective action measures and/or natural attenuation.

F1.2 AN OVERVIEW OF METHODOLOGY

As recommended by US EPA guidance document "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Final Guidance" (US EPA, 1989), the Mann-Kendall test (Mann, 1945; Kendall, 1975) is used to evaluate whether temporal trends are present in the observed groundwater constituent concentrations. The Mann-Kendall test is a nonparametric statistical procedure (i.e., an underlying population distribution need not be assumed) that uses the relative magnitudes of the data rather than their measured values. The method facilitates evaluation of non-detects and trace-level concentrations of chemical constituents. This procedure also allows the use of data sets with missing data. The Mann-Kendall test is also viewed as a non-parametric test for zero slope of the linear regression of time-ordered data versus time (Gilbert, 1987).

The Mann-Kendall test employs hypothesis testing as the means to evaluate whether temporal trends are present in a data set. Hypothesis testing implies that there are two theories (or hypotheses) regarding the observed data: the hypothesis being proposed by the observer and the negation of this hypothesis. The former, denoted by H_1, is the *alternative hypothesis*; the latter is denoted by H_0 and is the *null hypothesis*. For the current analysis, the alternative hypothesis is the presence of a temporal trend, whereas the null hypothesis is the absence of a temporal trend. To test the two hypotheses, a test statistic (Z) is calculated from the observed data and compared to a statistical critical value ($t_{1-\propto}$) estimated based on a predefined confidence level ($1-\propto$) and statistical table. Z is calculated using the following equation:

$$Z = \frac{S-1}{[V(S)]^{0.5}} \quad if\ S>0 \quad or \quad Z = \frac{S+1}{[V(S)]^{0.5}} \quad if\ S<0,$$

Where S = Mann-Kendall Test Statistic; and

$V(S)$ = Variance of the Mann-Kendall Test Statistic.

If S is less than 0, the data suggest a potential decreasing trend; when S is greater than 0, the data suggest a potential increasing trend. For the former case, if Z is greater than $t_{1-\alpha}$, H_1 is accepted and H_0 is rejected. For the latter case, if the absolute value of Z is greater than $t_{1-\alpha}$, H_1 is accepted and H_0 is rejected. Under the current testing framework, H1 can represent either an increasing or decreasing temporal trend. The dual sidedness of this hypothesis requires that a two-tailed critical test be used. For a two-tailed critical test, the statistical critical value is estimated as $t_{1-\alpha/2}$. The statistical critical value for a 95% confidence level is 1.96. If Z is less than $t_{1-\alpha/2}$, the observed data do not support the hypothesis that a temporal trend exists.

F1.3 SUMMARY OF ANALYSIS

In preparation of this Groundwater Treatment System (GWTS) annual progress report, the statistical trend analysis method described above was used as part of the remedial performance evaluation. The trend analyses were performed for selected indicator parameters specific to a given site. A summary of GWTS sites, parameters evaluated for trends, and the data range in terms of years is presented in the following table:

SITE	PARAMETER	DATA RANGE (YEARS)
LF04	TCE	1986 – 2005
OT20	TCE	1993 – 2005
LF03	CHLOROBENZENE	1991 – 2005
OT17	TCE	1989 – 2005
OT37	TCE	1997 – 2005
OT41	(not tested)[1]	2002 – 2005

Notes:

(1) Data collection for OT41 (SWMU 59 & SWMU 60) began in 2002. The quantity of data available in this time period is not sufficient to perform a reliable trend analysis based on sound statistical methods. Therefore, trend analysis was not performed on OT41 data. However, for illustration purposes the concentration versus time data are presented graphically in this appendix under subsection Appendix C7.

The remainder of this appendix presents the summary of analysis (in tabular format) for each site; the groundwater concentration data versus time are also depicted graphically to illustrate the presence or absence of time trends for each well. Detailed evaluation of the data is presented in the main body of the report under sections designated for remedial performance evaluation for each of the GWTS sites.

F1.4 REFERENCES

Gilbert, R. O., 1987. Statistical Methods for Environmental Pollution Monitoring. Van Nostrand Reinhold, New York

Kendall, M.G., 1975. *Rank Correlation Methods*, 4th ed. Charles Griffin, London.

Mann, H.B., 1945. Non-Parametric tests against trend, *Econometrica* 13:245-259.

US EPA, 1989. Statistical analysis of ground-water monitoring data at RCRA facilities, Interim Final Guidance.

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Appendix F.2

Statistical Trend Analysis Results

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LF04

Data Measured from 9/16/1986 to 7/6/2005

Well No.	Aquifer	n	S	VAR(S)	Z	Critical Value	Trend at 95% Confidence Level	Time Trend Plot (attached subsequent to table)
TRICHLOROETHYLENE(µg/L)								
RW1	Quat	24	-2	1,612.7	-0.02	1.96	No Trend	√
RW2	Quat	23	-156	1,428.0	-4.10	1.96	Decreasing	√
RW3	Quat	23	-48	1,423.3	-1.25	1.96	No Trend	√
RW4	Quat	26	-181	2,049.7	-3.98	1.96	Decreasing	√
RW5	Quat	21	-95	1,093.7	-2.84	1.96	Decreasing	√
RW6	Quat	18	-132	696.0	-4.97	1.96	Decreasing	√
LF4-5	Uprov	16	46	367.3	2.35	1.96	Increasing	
LF4-6	Quat	16	-88	493.3	-3.92	1.96	Decreasing	√
LF4-7	Lprov	14	0	0.0	0.00	1.96	No Trend	
LF4-8	Uprov	16	-86	461.3	-3.96	1.96	Decreasing	√
LF4-10	Lprov	15	8	74.7	0.81	1.96	No Trend	
LF4-11	Uprov	17	1	581.7	0.00	1.96	No Trend	√
LF4-14	Uprov	16	-10	491.3	-0.41	1.96	No Trend	√
LF4-16	Quat	18	--	--	--	1.96	--	√
LF4-17	Quat	18	-118	691.3	-4.45	1.96	Decreasing	√
LF4-18	Quat	19	-114	814.0	-3.96	1.96	Decreasing	√
LF4-19	Quat	18	-38	680.0	-1.42	1.96	No Trend	√
LF4-20	Surf	16	--	--	--	1.96	--	√
LF4-23	Quat	16	-65	492.3	-2.88	1.96	Decreasing	√
LF4-27	Quat	16	-91	492.3	-4.06	1.96	Decreasing	√
LF4-28	Surf	16	--	--	--	1.96	--	√
LF4-29	Surf	16	--	--	--	1.96	--	√
LF4-30	Quat	16	-85	487.7	-3.80	1.96	Decreasing	√
LF4-34	Uprov	16	-13	85.0	-1.30	1.96	No Trend	
LF4-35	Lprov	14	0	0.0	0.00	1.96	No Trend	
LF4-36	Uprov	16	-3	85.0	-0.22	1.96	No Trend	
LF4-37	Lprov	16	-9	159.7	-0.63	1.96	No Trend	
LF4-38	Uprov	16	-13	85.0	-1.30	1.96	No Trend	
LF4-39	Lprov	16	11	85.0	1.08	1.96	No Trend	
LF4-40	Uprov	16	--	--	--	1.96	--	√
LF4-41	Lprov	14	10	168.7	0.69	1.96	No Trend	
LF4-42	Uprov	16	--	--	--	1.96	--	√
LF4-43	Lprov	14	3	121.0	0.18	1.96	No Trend	
LF4-44	Surf	16	9	159.7	0.63	1.96	No Trend	
LF4-45	Lprov	14	0	0.0	0.00	1.96	No Trend	
LF4-46	Uprov	14	--	--	--	1.96	--	√
LF4-47	Uprov	14	-75	331.7	-4.06	1.96	Decreasing	√
LF4-48	Uprov	14	26	305.3	1.43	1.96	No Trend	√
LF4BL1	Bluff	17	--	--	--	1.96	--	√
LF4BL2	Bluff	17	--	--	--	1.96	--	√
LF4BL3	Bluff	14	0	0.0	0.00	1.96	No Trend	
LF4BL4CU	Cusseta	14	0	0.0	0.00	1.96	No Trend	
LF4BL5	Bluff	14	0	0.0	0.00	1.96	No Trend	

LF04

Data Measured from 9/16/1986 to 7/6/2005

Well No.	Aquifer	n	S	VAR(S)	Z	Critical Value	Trend at 95% Confidence Level	Time Trend Plot (attached subsequent to table)
TRICHLOROETHYLENE(µg/L)								
LF4BL6	Bluff	14	-1	65.0	0.00	1.96	No Trend	
LF4BL7	Bluff	10	0	0.0	0.00	1.96	No Trend	
LF4BL8	Bluff	10	-5	33.0	-0.70	1.96	No Trend	
LF4PR1	Lprov	17	--	--	--	1.96	--	√
LF4PR2	Lprov	17	--	--	--	1.96	--	√
LF4PR3	Uprov	17	--	--	--	1.96	--	√
LF4PR4	Uprov	17	72	572.7	2.97	1.96	Increasing	√
LF4WP1	Pc	17	--	--	--	1.96	--	√
LF4WP2	Pc	15	0	0.0	0.00	1.96	No Trend	
LF4WP7	Quat	17	-94	582.0	-3.85	1.96	Decreasing	√
LF4WP8	Quat	17	-45	588.3	-1.81	1.96	No Trend	√
LF4WP9	Quat	17	-100	587.3	-4.09	1.96	Decreasing	√
LF4WP10	Quat	17	-86	580.7	-3.53	1.96	Decreasing	√
LF4WP11	Quat	17	-82	587.3	-3.34	1.96	Decreasing	√
LF4WP12	Quat	17	-55	588.3	-2.23	1.96	Decreasing	√
LSB5	Surf	11	--	--	--	1.96	--	√
LSB11	Surf	11	--	--	--	1.96	--	√
LSB13	Surf	12	--	--	--	1.96	--	√
LSB14	Surf	12	--	--	--	1.96	--	√
LSB15	Surf	11	--	--	--	1.96	--	√
RI1-1W	Lprov	18	-40	691.3	-1.48	1.96	No Trend	√
RI1-2W	Uprov	18	-69	695.0	-2.58	1.96	Decreasing	√
RI1-3W	Lprov	17	9	584.3	0.33	1.96	No Trend	√
RI1-4W	Uprov	17	-85	586.3	-3.47	1.96	Decreasing	√
RI1-6W	Uprov	16	-85	483.7	-3.82	1.96	Decreasing	√
RI1-7W	Uprov	16	33	489.7	1.45	1.96	No Trend	√

Notes:

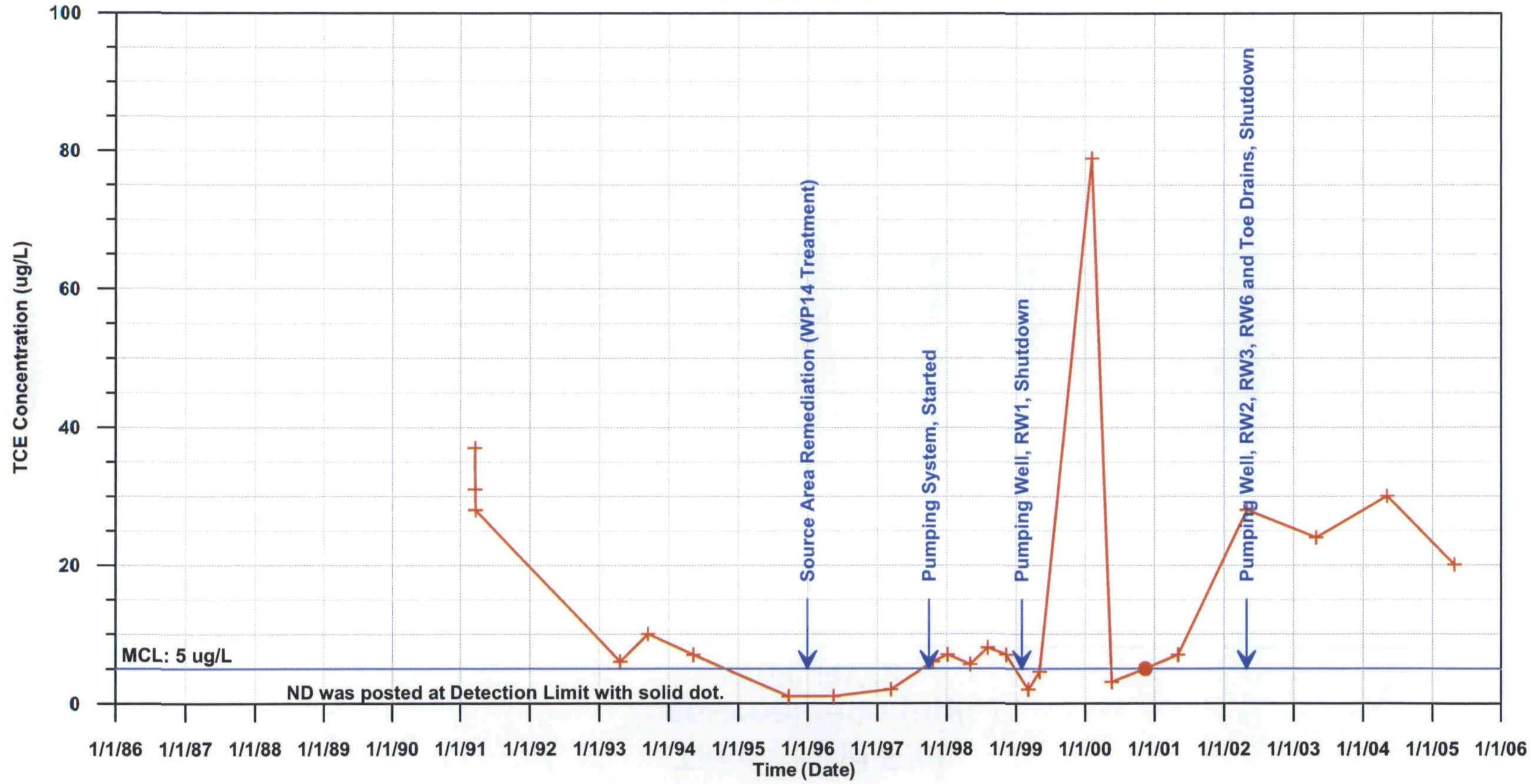
Wells that have historically had concentrations below detection limits on a consistent basis have not been included in this time trend analysis.

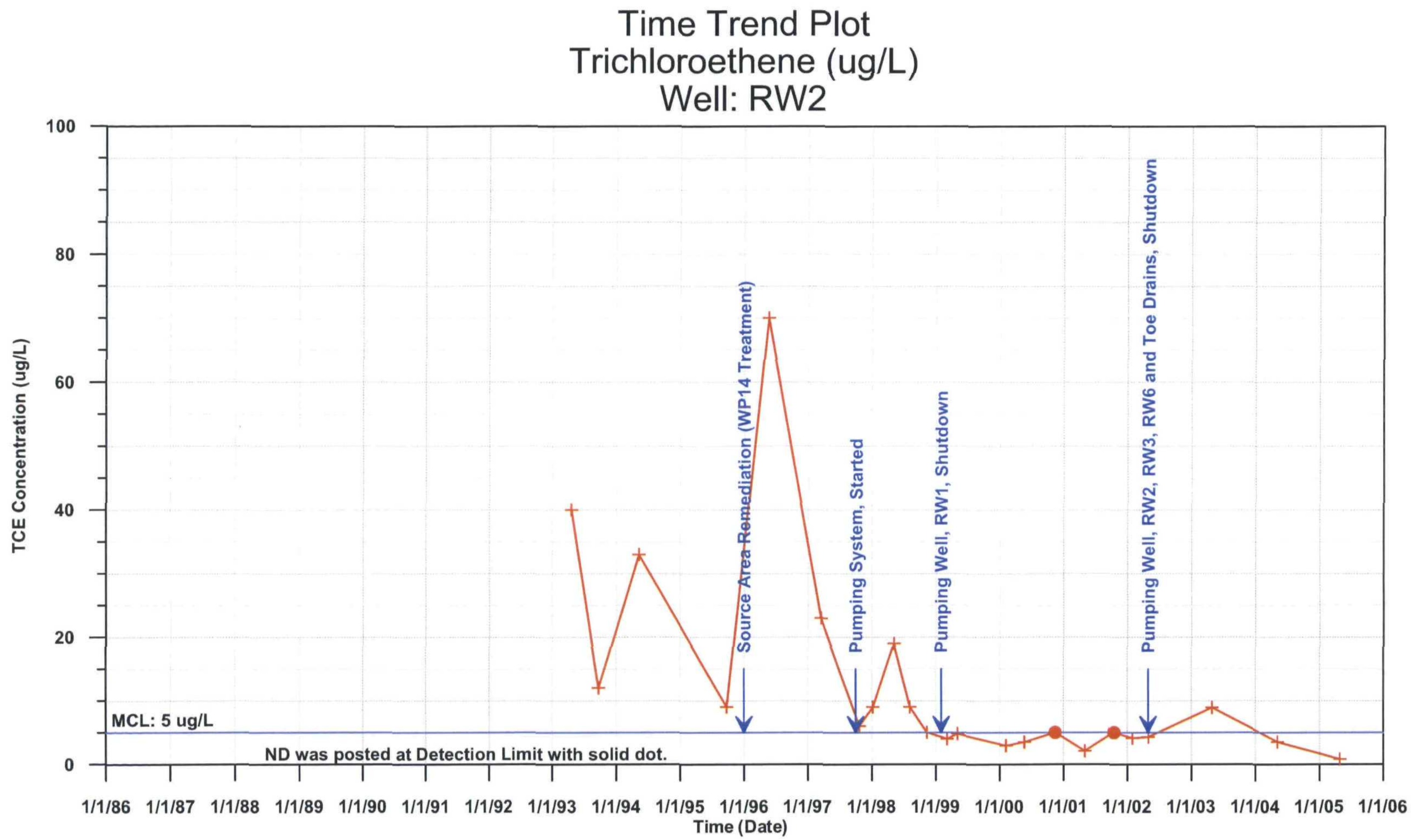
-- Time Trend analyses are not performed due to the high number of non-detects. However, the time trend charts are presented for information purposes.

Hydrogeologic Units:

Uprov - Upper Providence.
Lprov - Lower Providence.
Surf - Surficial.
Quat - Quaternary Alluvium.
Pc - Peat Clay.
Bluff - Blufftown.
Cusseta - Cusseta.

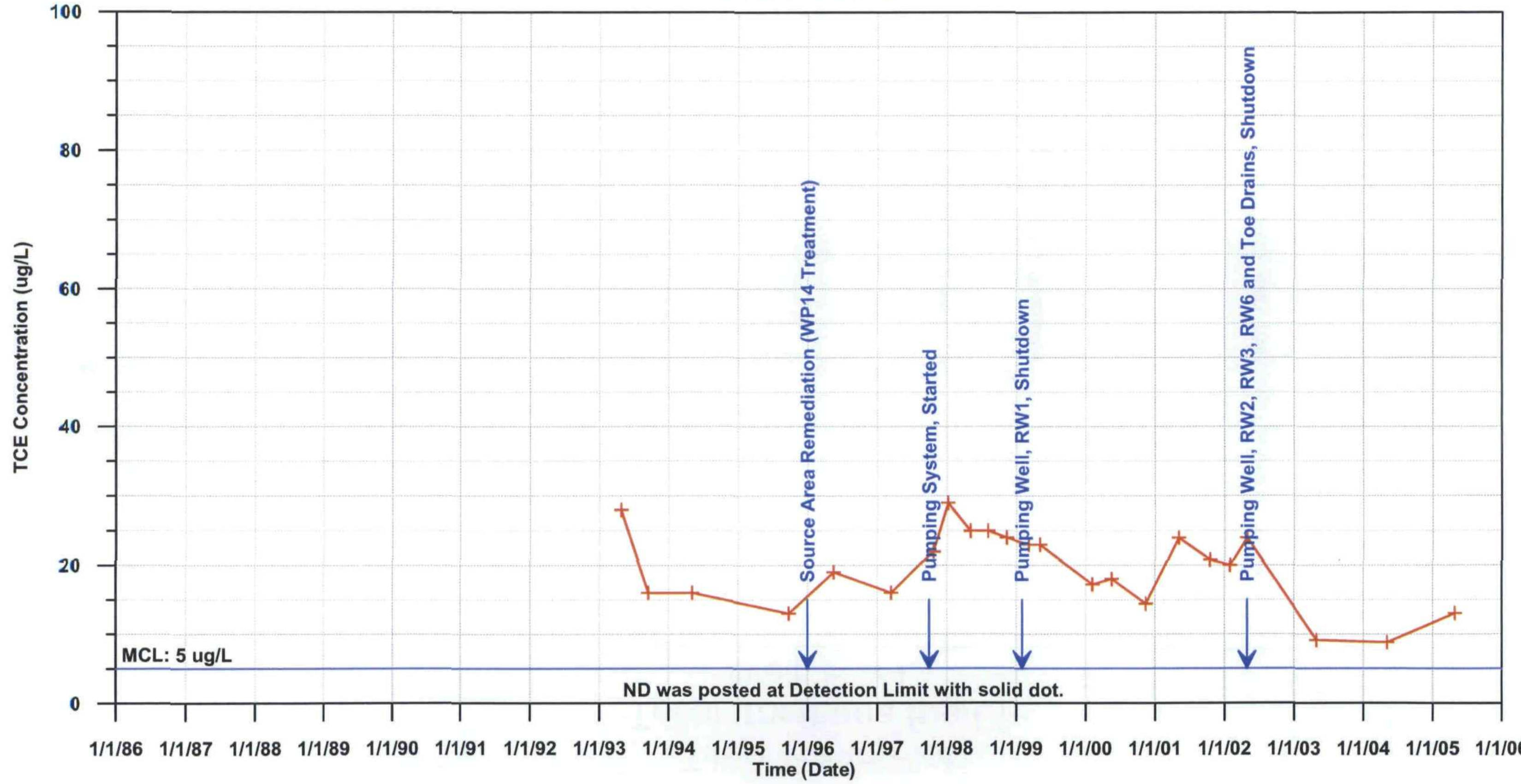
Time Trend Plot
Trichloroethene (ug/L)
Well: RW1

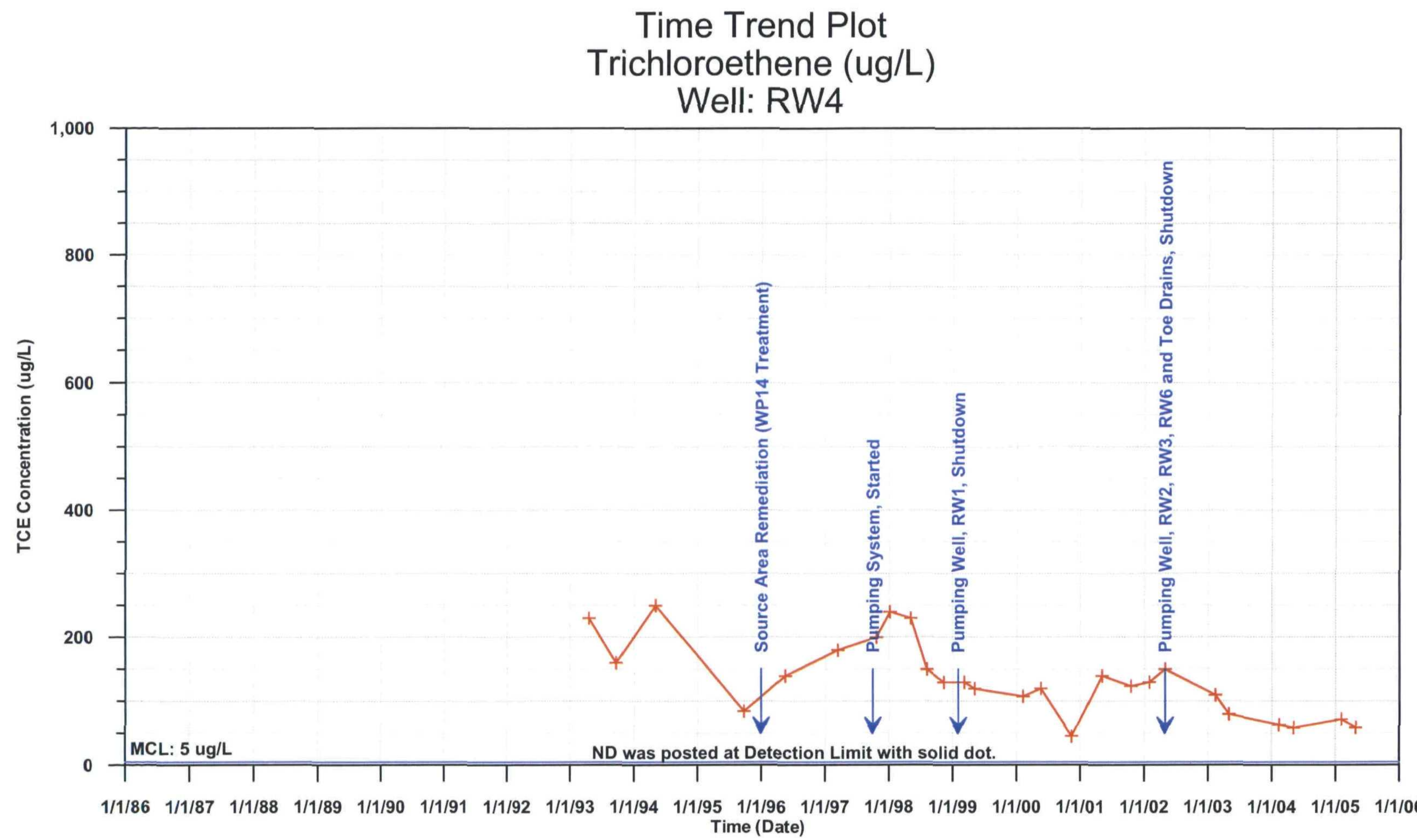




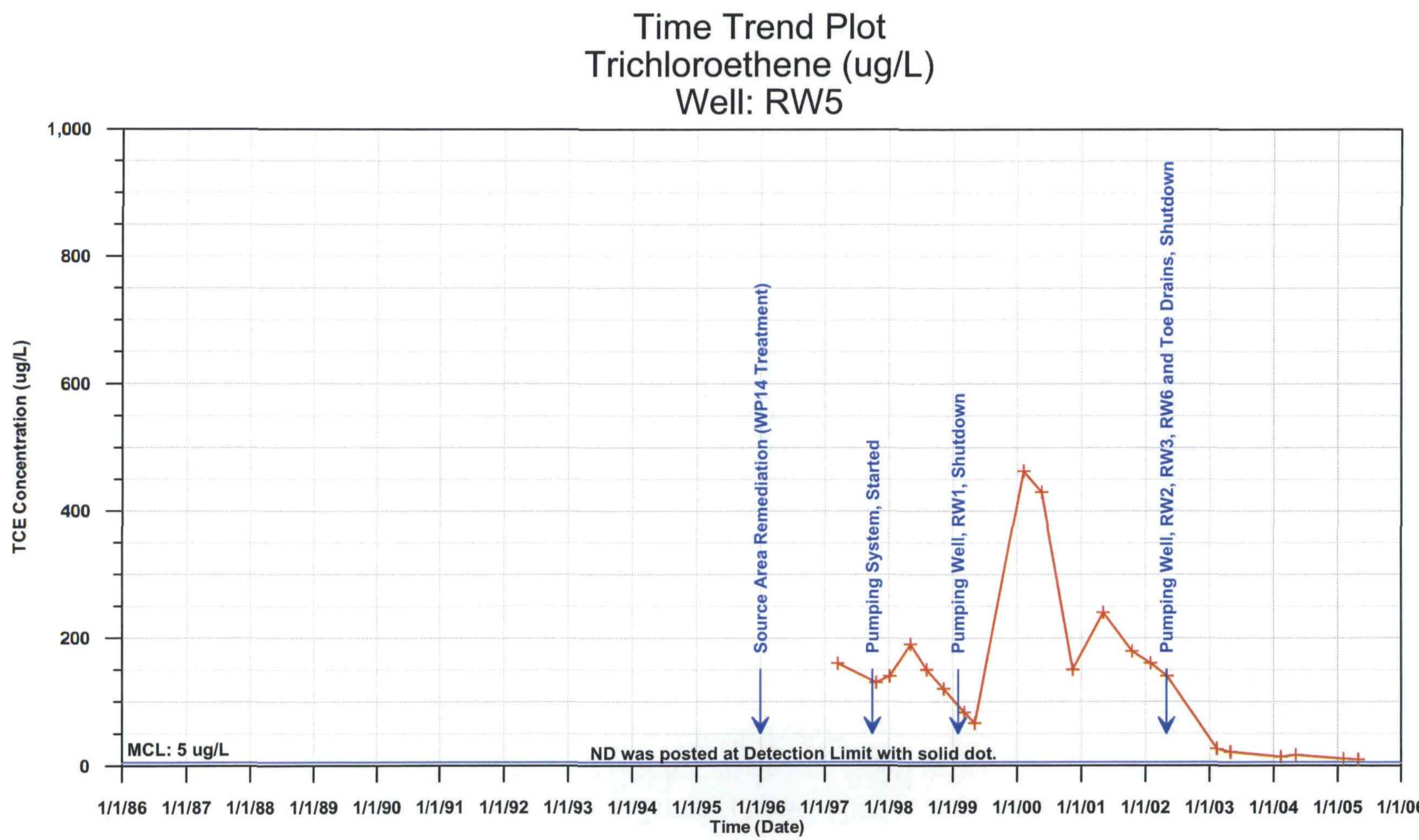
Time Trend Plot
Trichloroethene (ug/L)
Well: RW2
TCE Concentration (ug/L)
100
80
60
40
20
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)

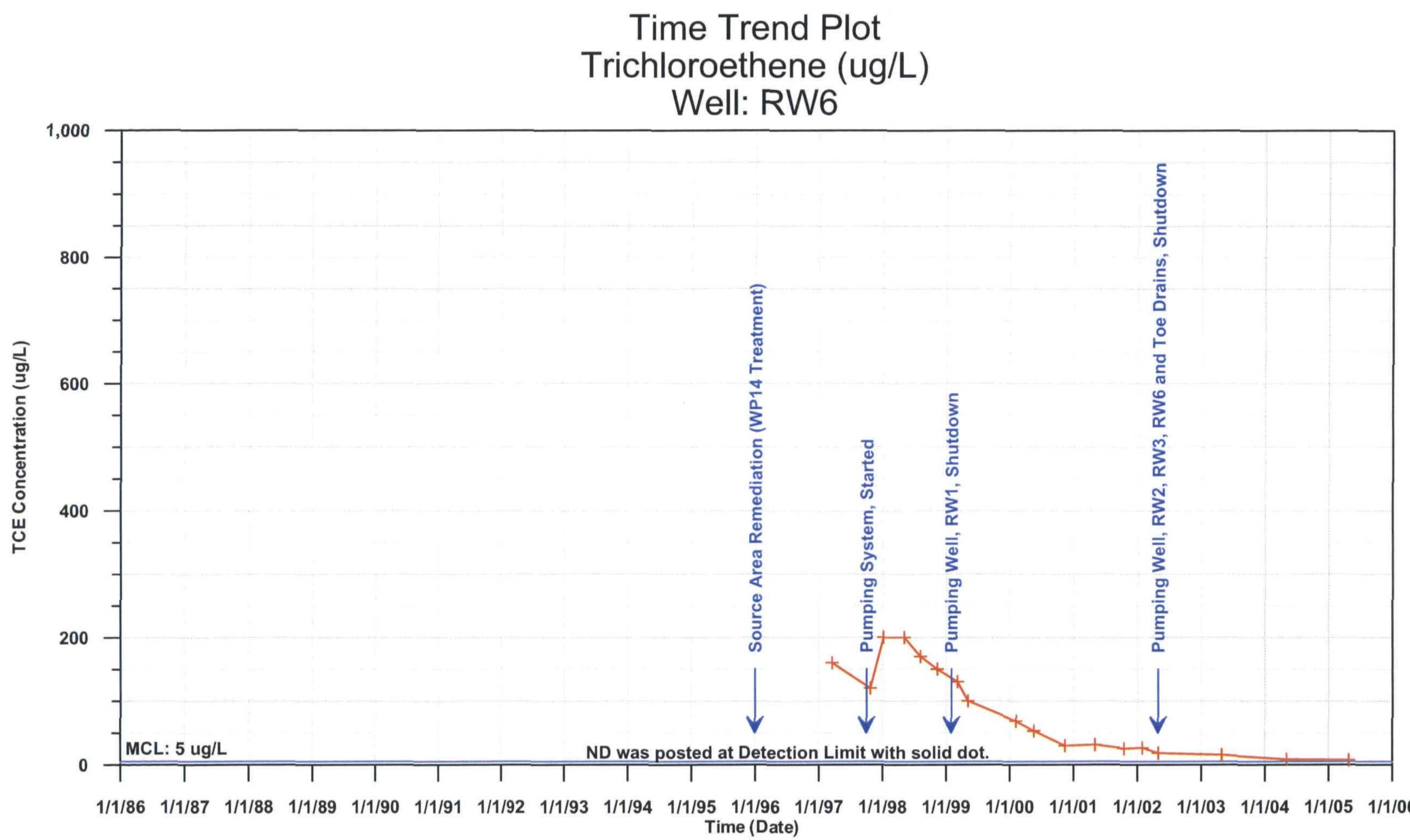
Time Trend Plot
Trichloroethene (ug/L)
Well: RW3





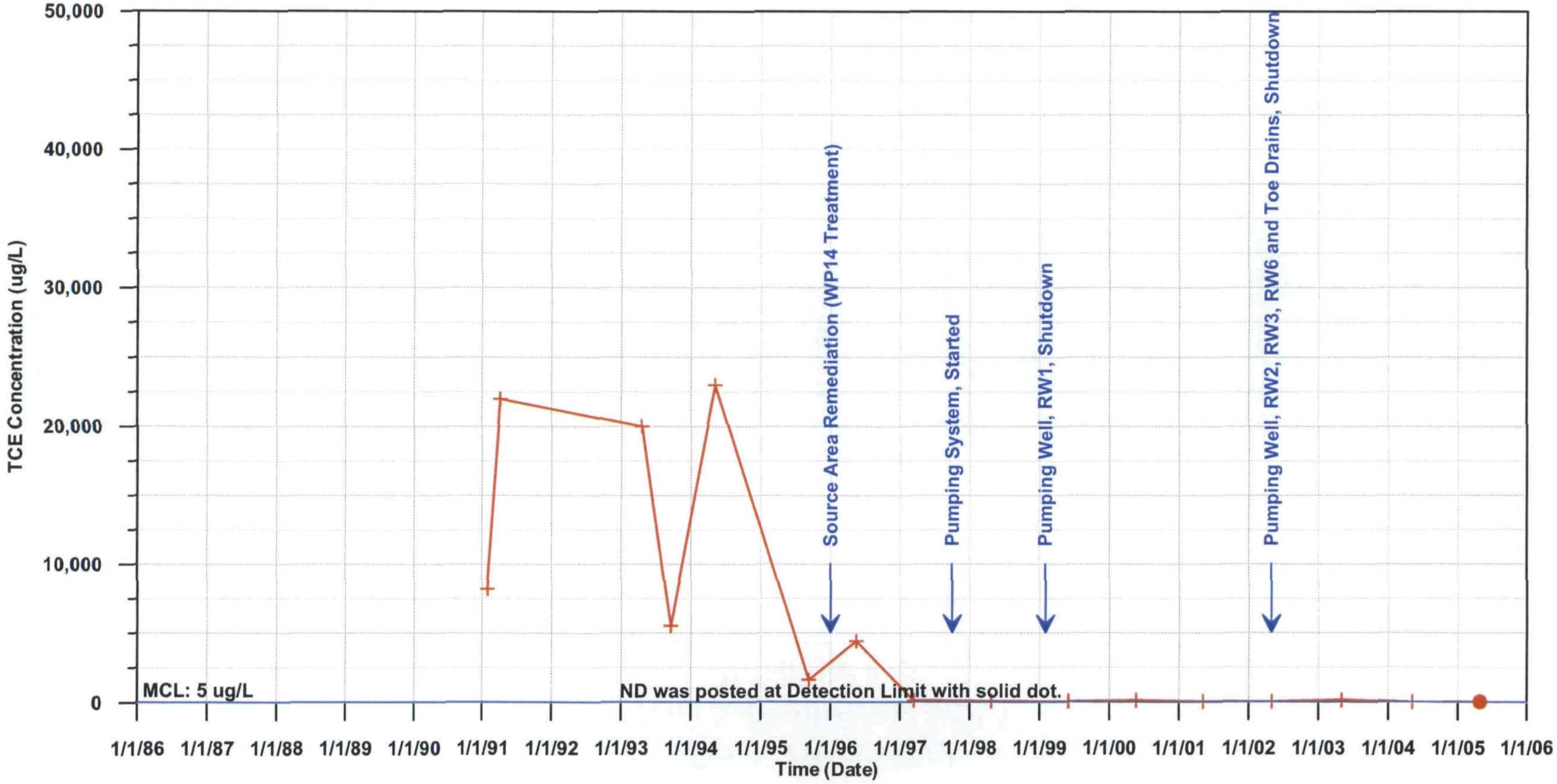
Time Trend Plot
Trichloroethene (ug/L)
Well: RW4
1,000
800
600
400
200
0
TCE Concentration (ug/L)
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
1/1/86
1/1/87
1/1/88
1/1/89
1/1/90
1/1/91
1/1/92
1/1/93
1/1/94
1/1/95
1/1/96
1/1/97
1/1/98
1/1/99
1/1/00
1/1/01
1/1/02
1/1/03
1/1/04
1/1/05
1/1/06
Time (Date)

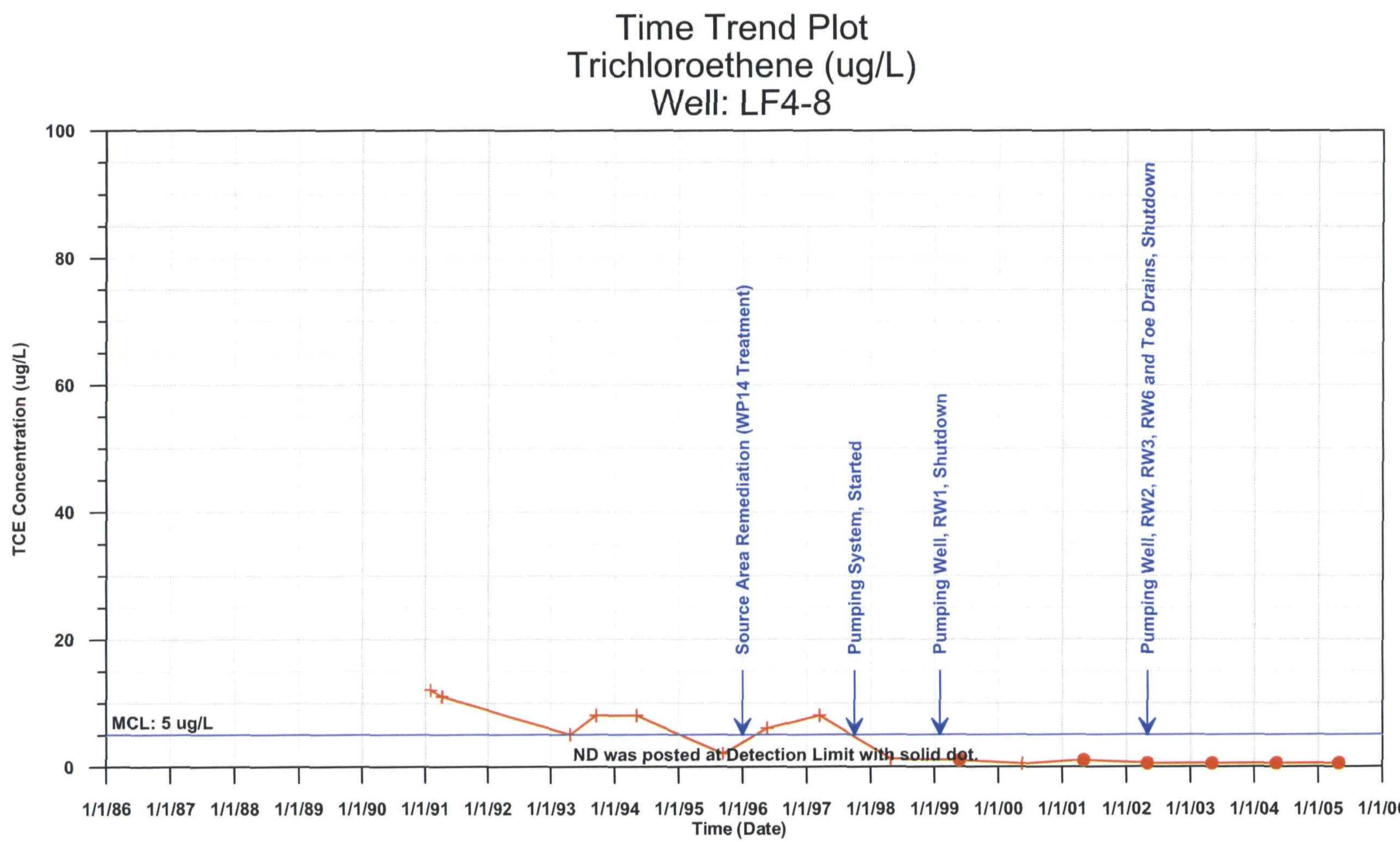

Time Trend Plot
Trichloroethene (ug/L)
Well: RW5
TCE Concentration (ug/L)
1,000
800
600
400
200
0
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
1/1/86
1/1/87
1/1/88
1/1/89
1/1/90
1/1/91
1/1/92
1/1/93
1/1/94
1/1/95
1/1/96
1/1/97
1/1/98
1/1/99
1/1/00
1/1/01
1/1/02
1/1/03
1/1/04
1/1/05
1/1/06
Time (Date)



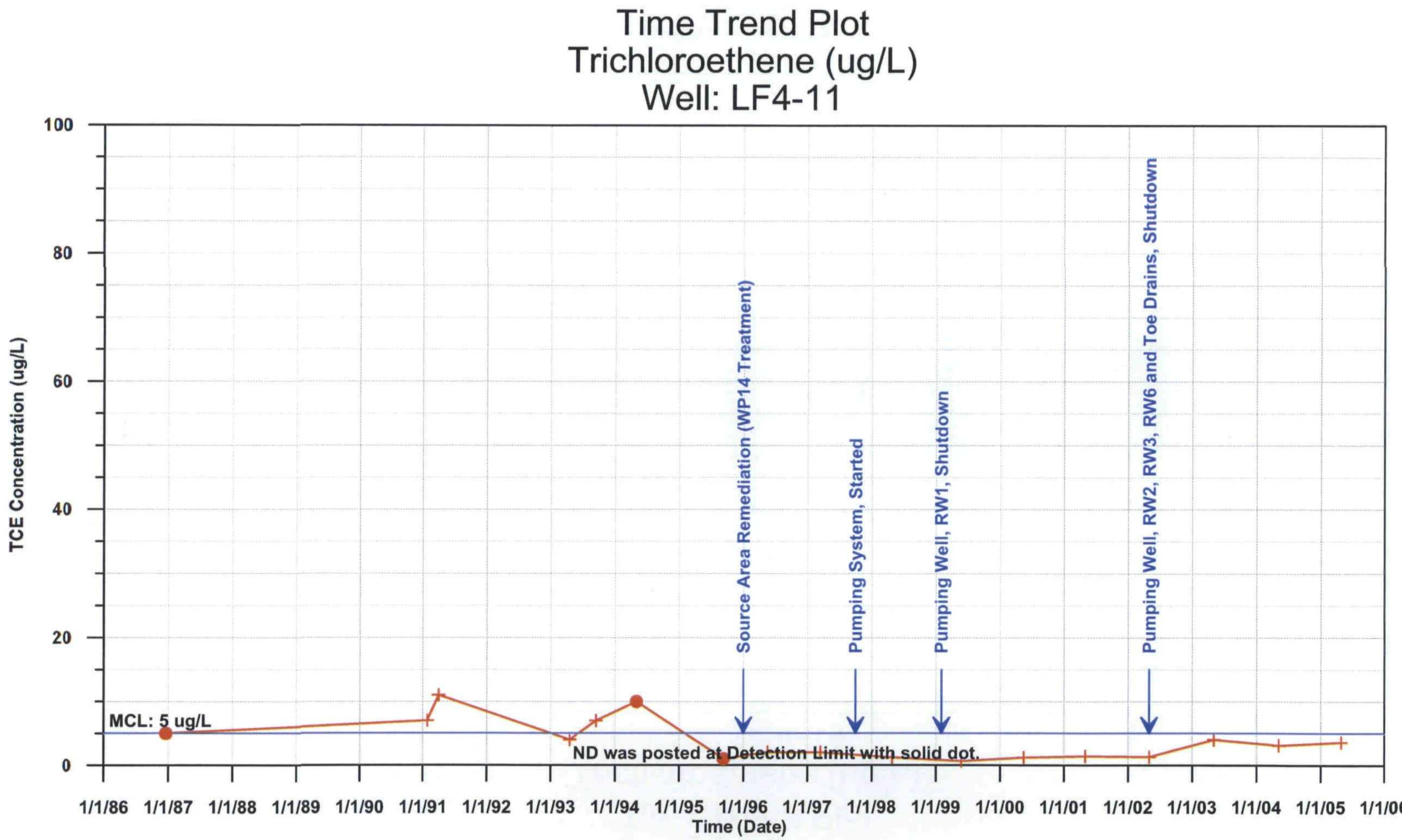
Time Trend Plot
Trichloroethene (ug/L)
Well: RW6
TCE Concentration (ug/L)
1,000
800
600
400
200
0
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)

Time Trend Plot
Trichloroethene (ug/L)
Well: LF4-6

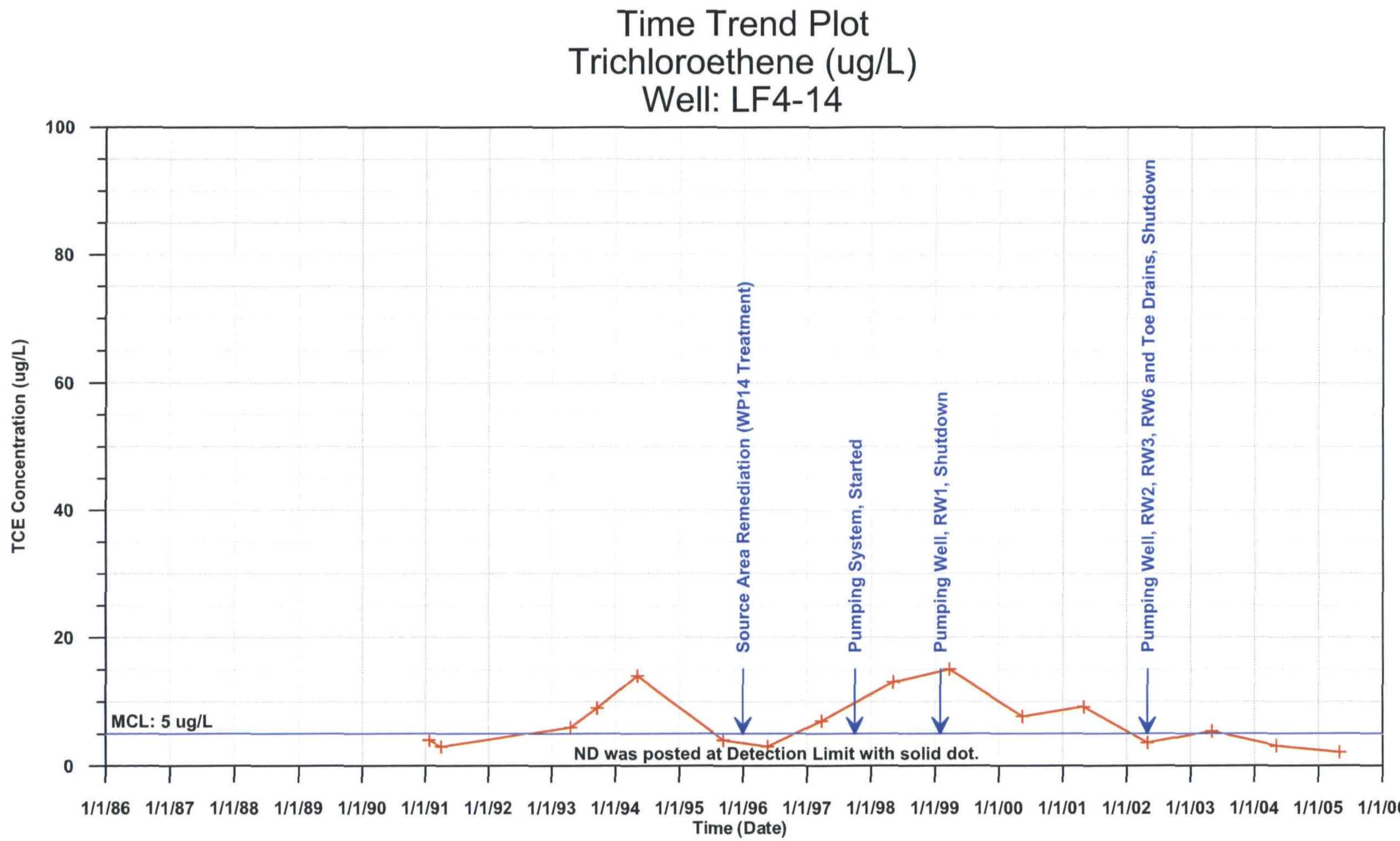




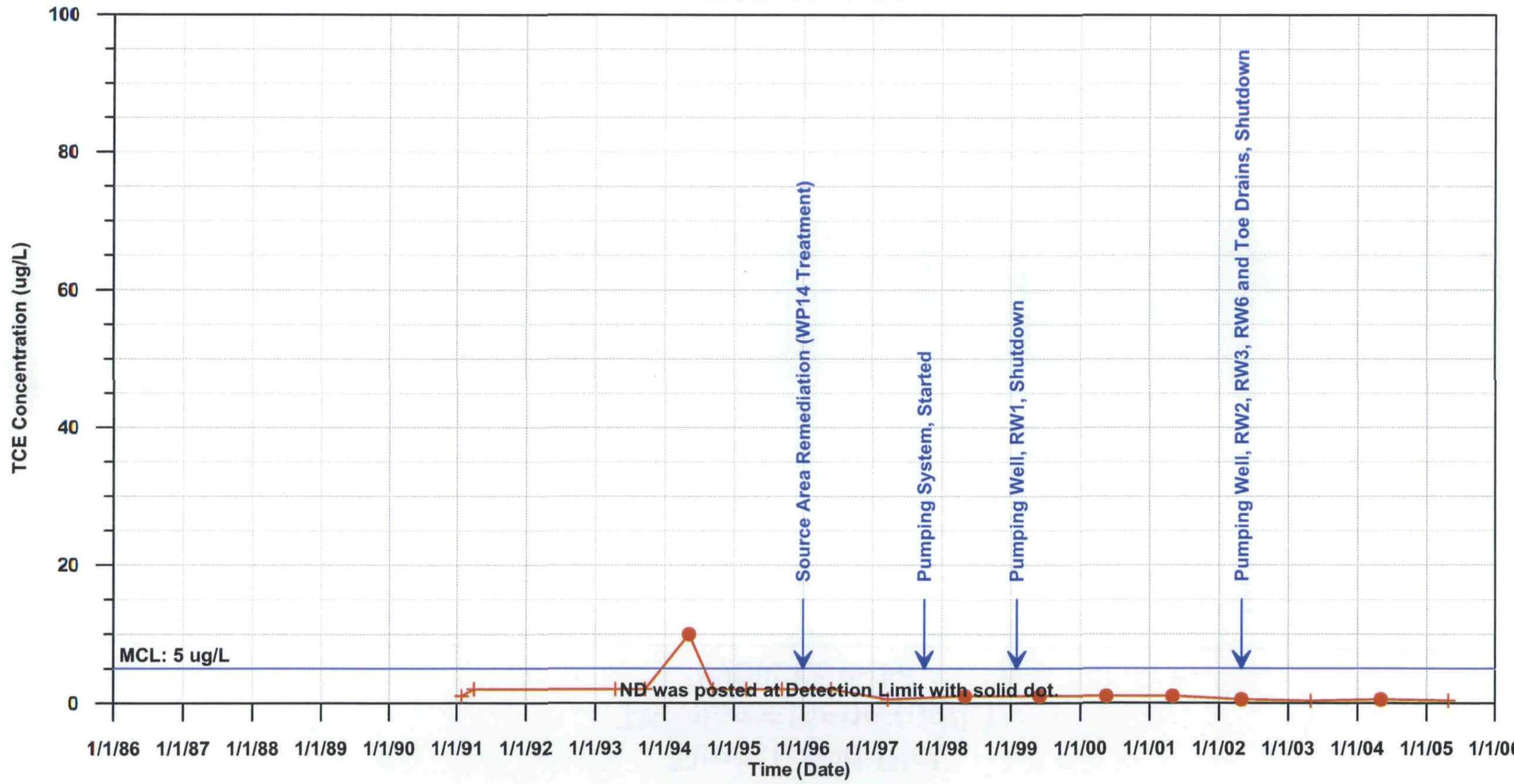
Time Trend Plot
Trichloroethene (ug/L)
Well: LF4-8
TCE Concentration (ug/L)
100
80
60
40
20
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86
1/1/87
1/1/88
1/1/89
1/1/90
1/1/91
1/1/92
1/1/93
1/1/94
1/1/95
1/1/96
1/1/97
1/1/98
1/1/99
1/1/00
1/1/01
1/1/02
1/1/03
1/1/04
1/1/05
1/1/06
Time (Date)

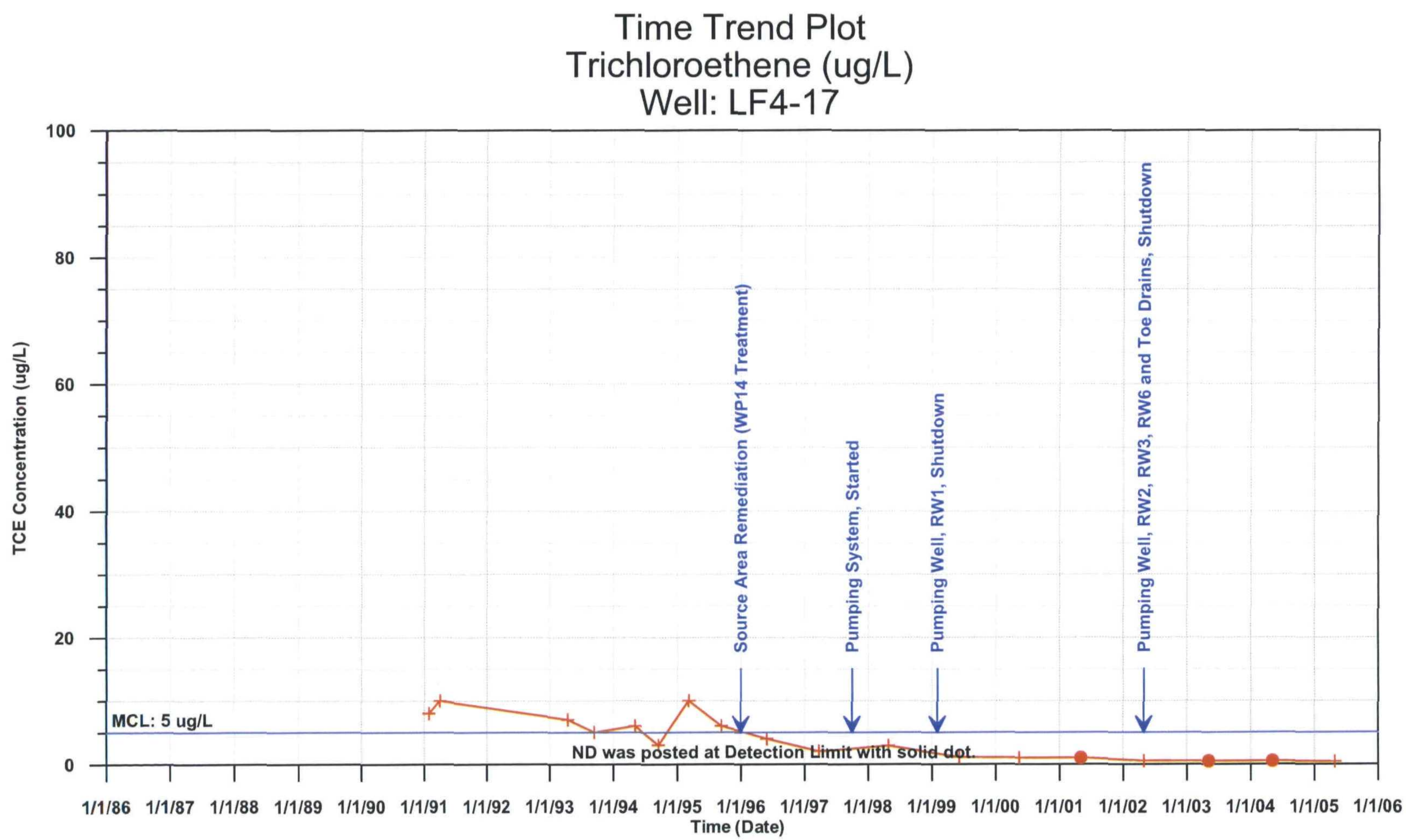


Time Trend Plot
Trichloroethene (ug/L)
Well: LF4-11
TCE Concentration (ug/L)
100
80
60
40
20
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)

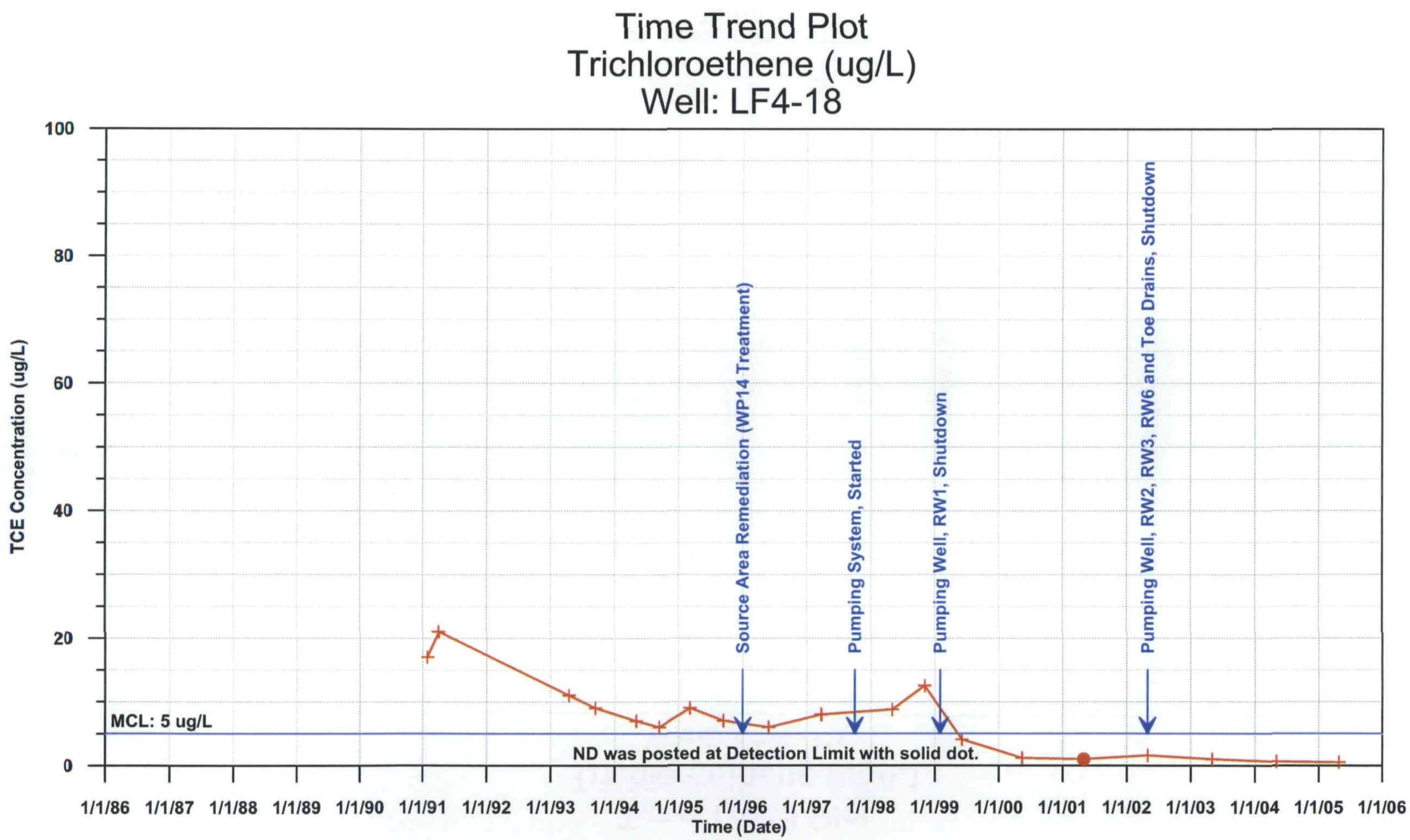

Time Trend Plot
Trichloroethene (ug/L)
Well: LF4-14
TCE Concentration (ug/L)
100
80
60
40
20
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)

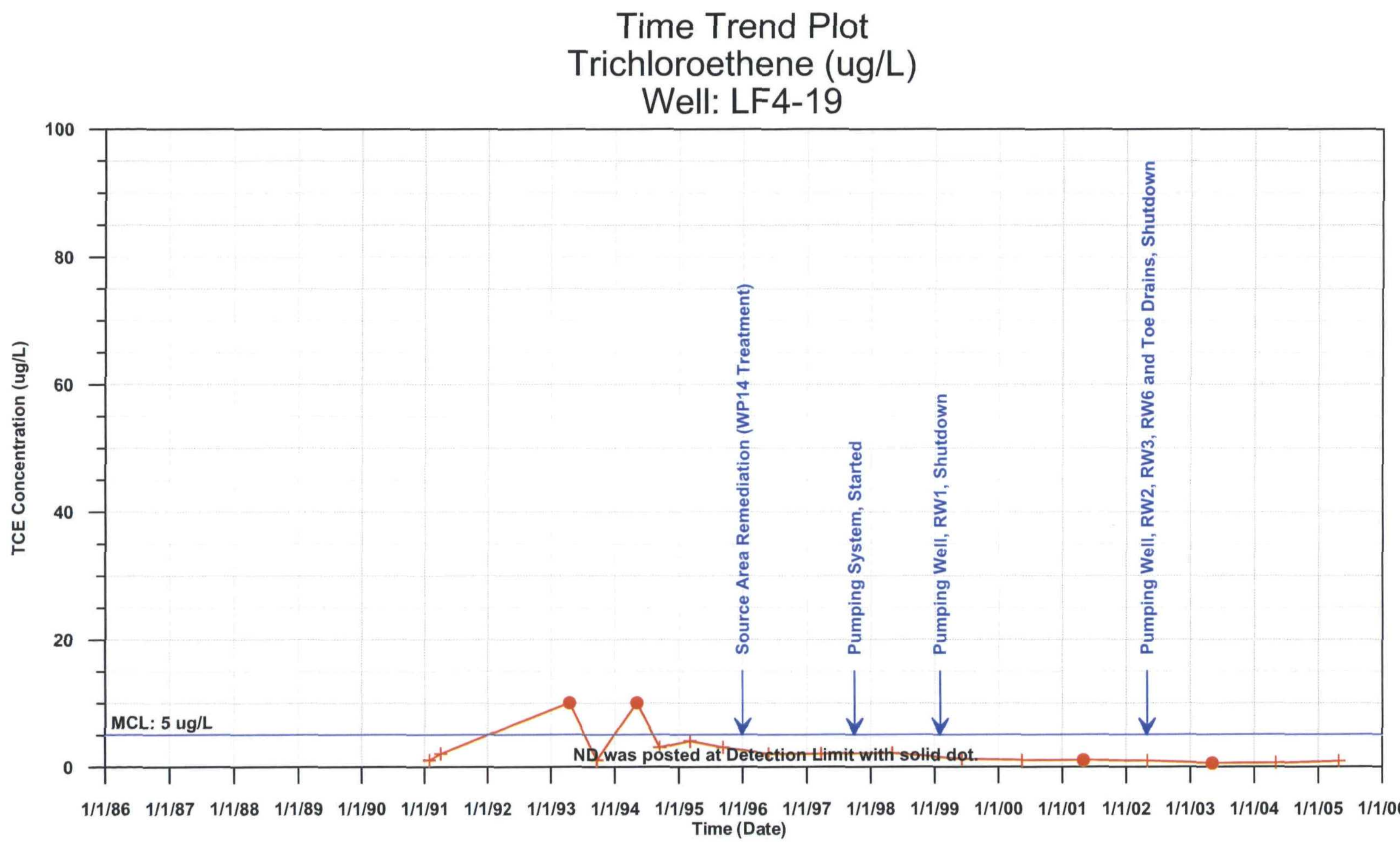
Time Trend Plot
Trichloroethene (ug/L)
Well: LF4-16



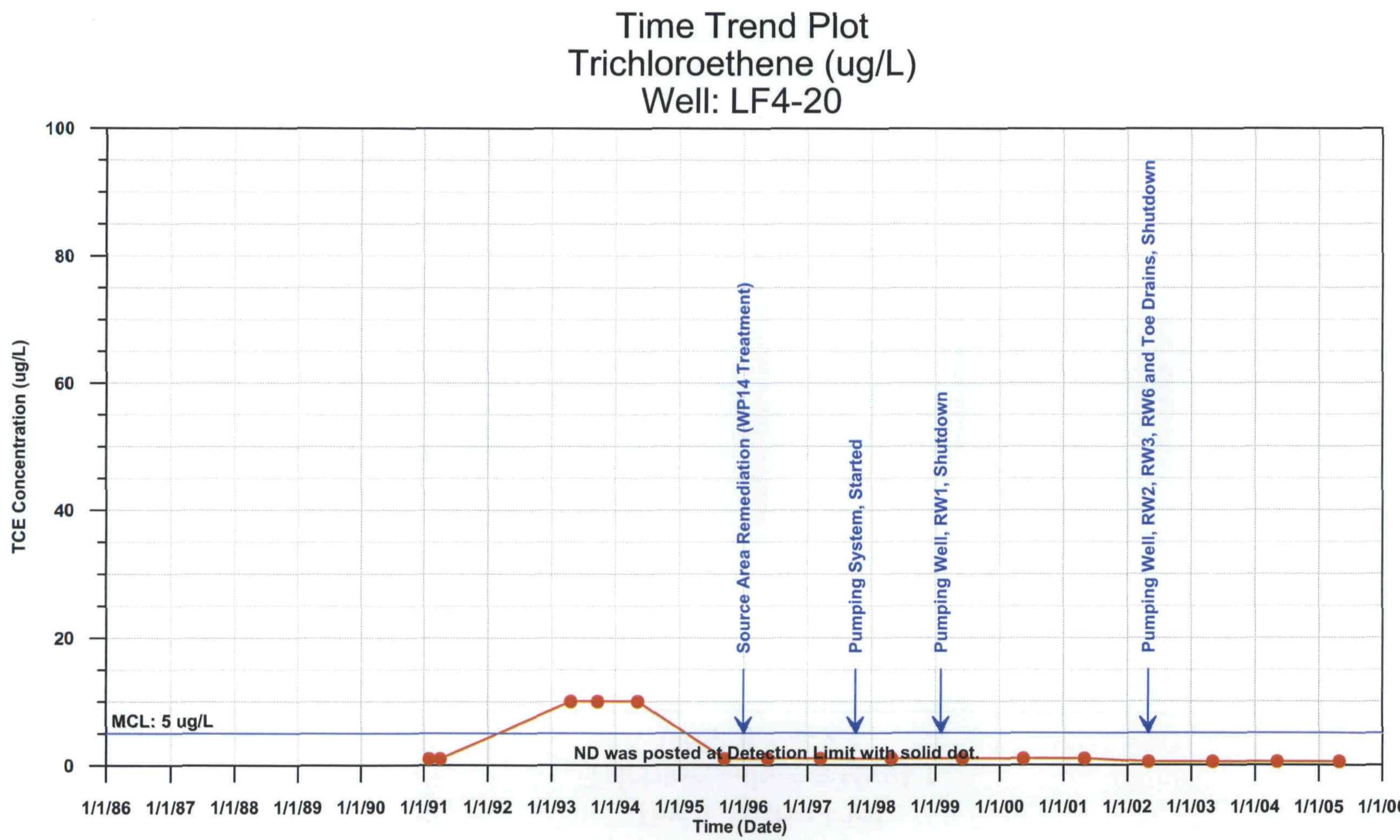


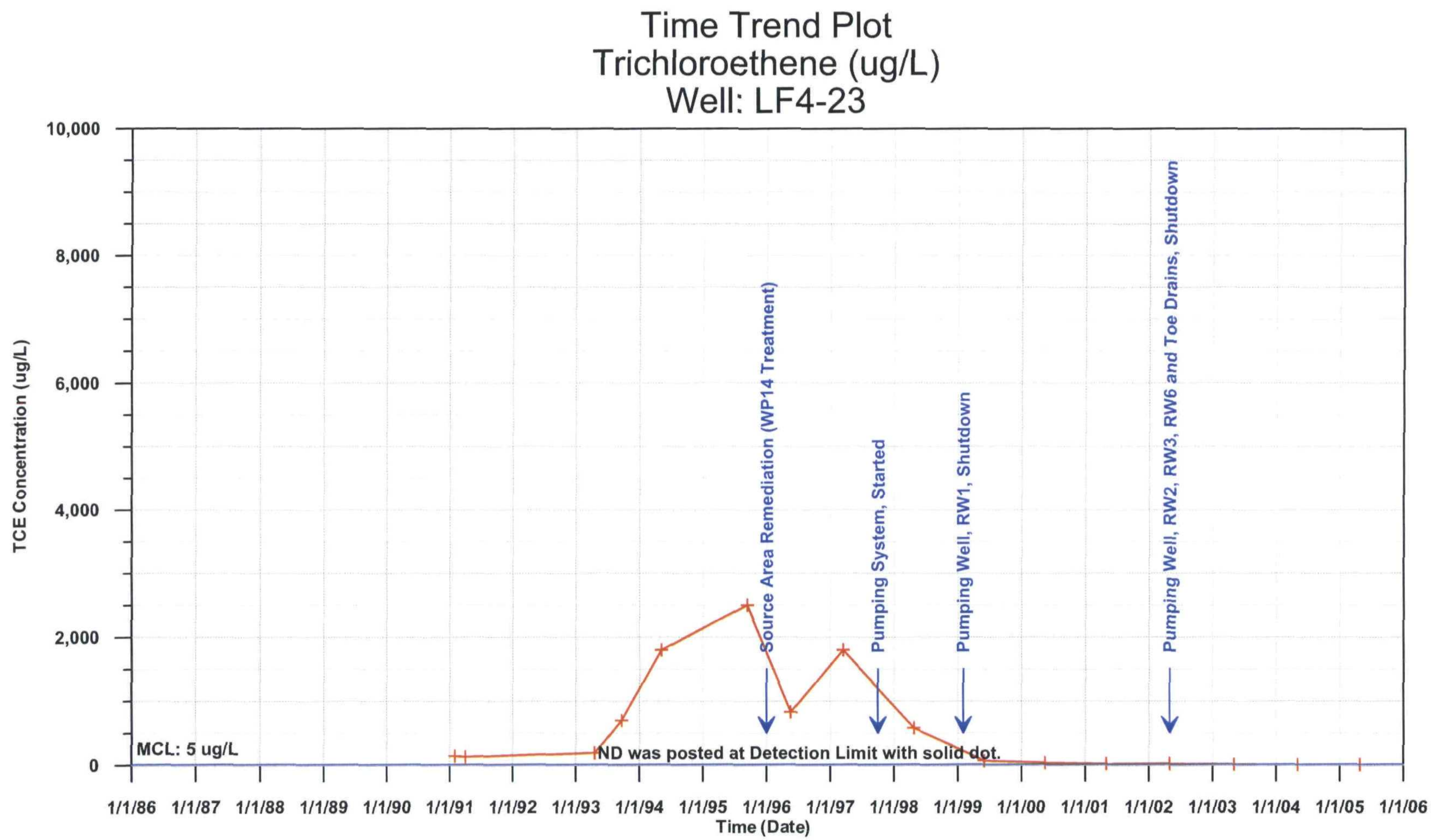
Time Trend Plot
Trichloroethene (ug/L)
Well: LF4-17
TCE Concentration (ug/L)
100
80
60
40
20
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)


Time Trend Plot
Trichloroethene (ug/L)
Well: LF4-18
100
80
60
40
20
0
TCE Concentration (ug/L)
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)

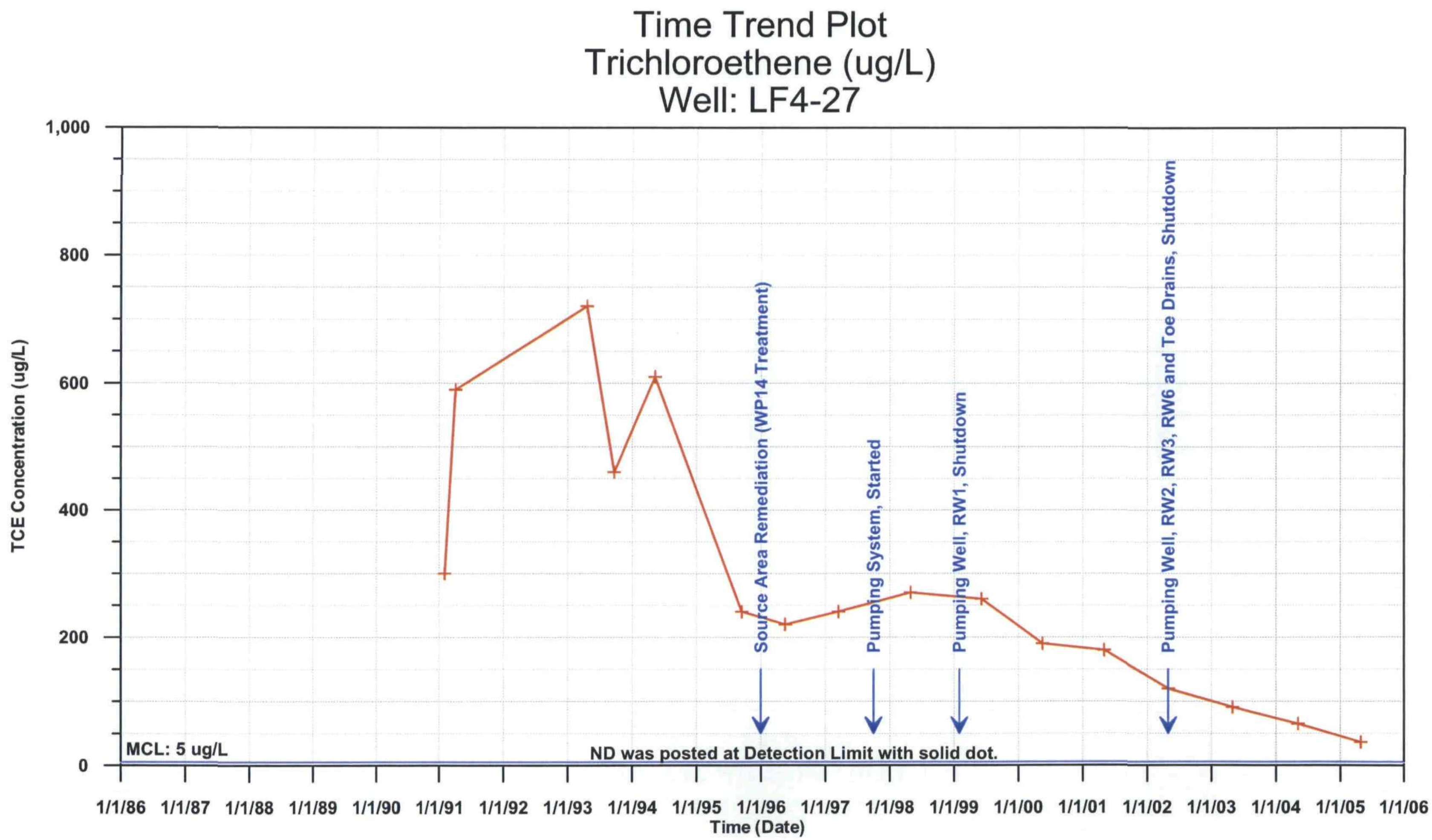


Time Trend Plot
Trichloroethene (ug/L)
Well: LF4-19
TCE Concentration (ug/L)
100
80
60
40
20
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)

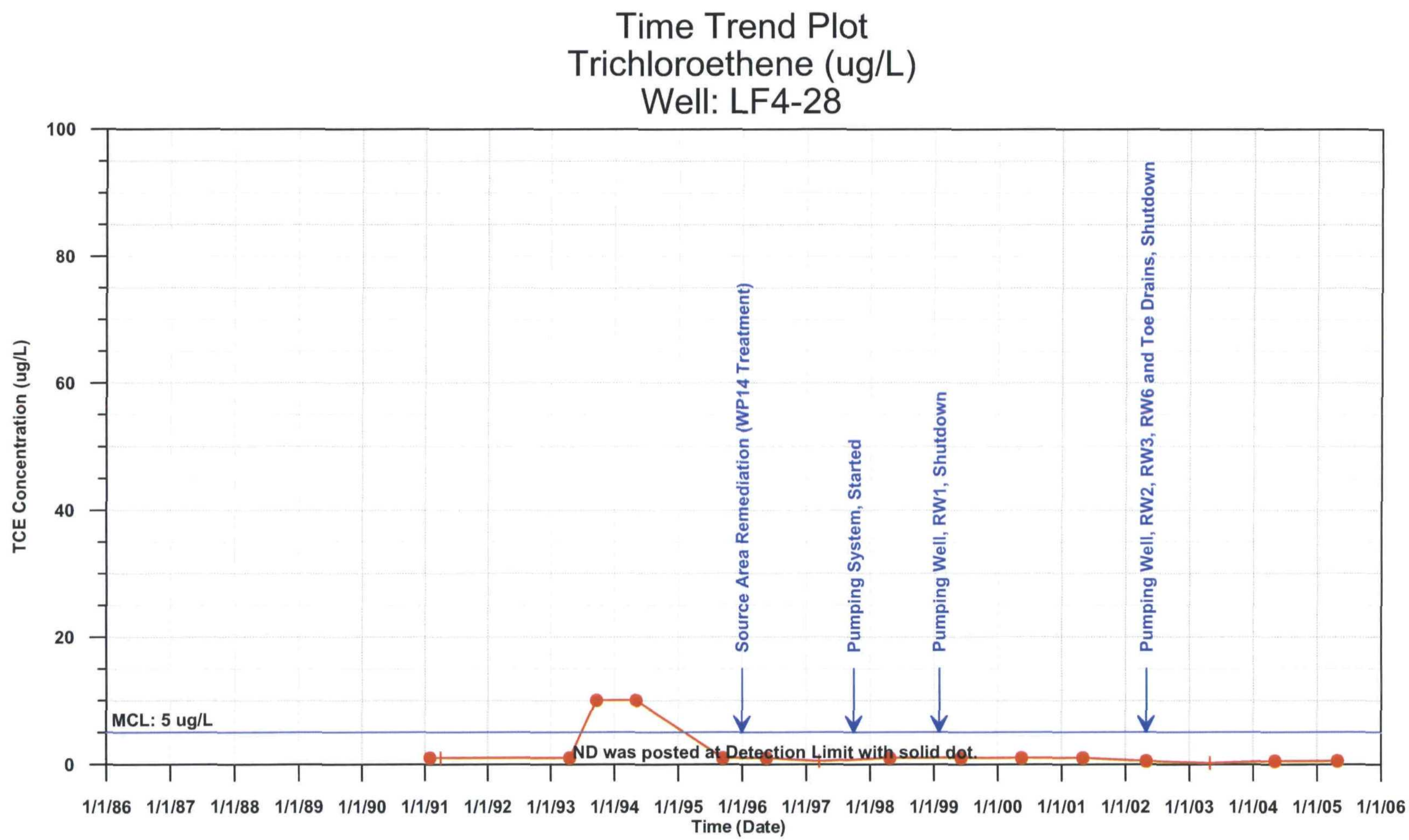

Time Trend Plot
Trichloroethene (ug/L)
Well: LF4-20
TCE Concentration (ug/L)
100
80
60
40
20
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)

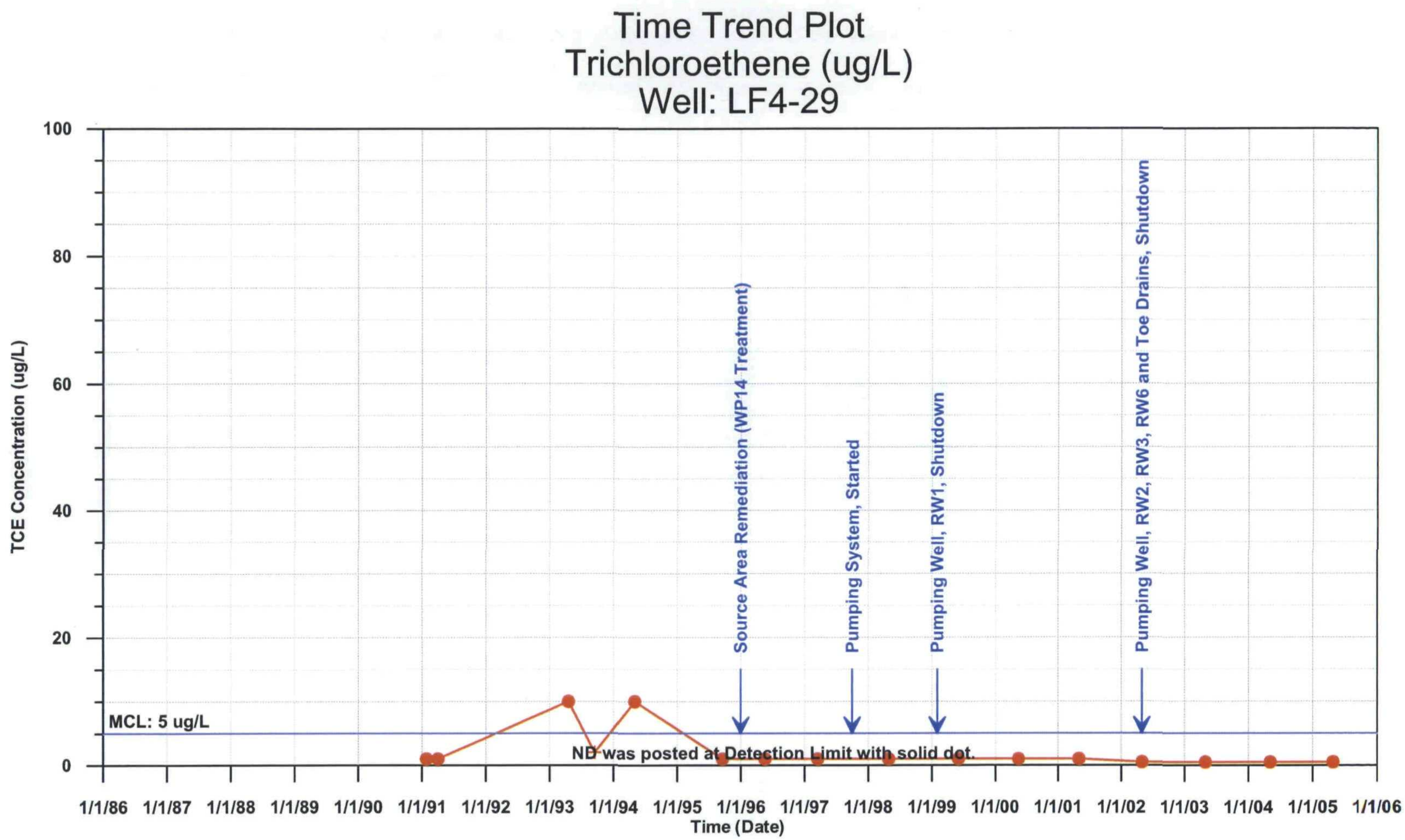


Time Trend Plot
Trichloroethene (ug/L)
Well: LF4-23
TCE Concentration (ug/L)
10,000
8,000
6,000
4,000
2,000
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)

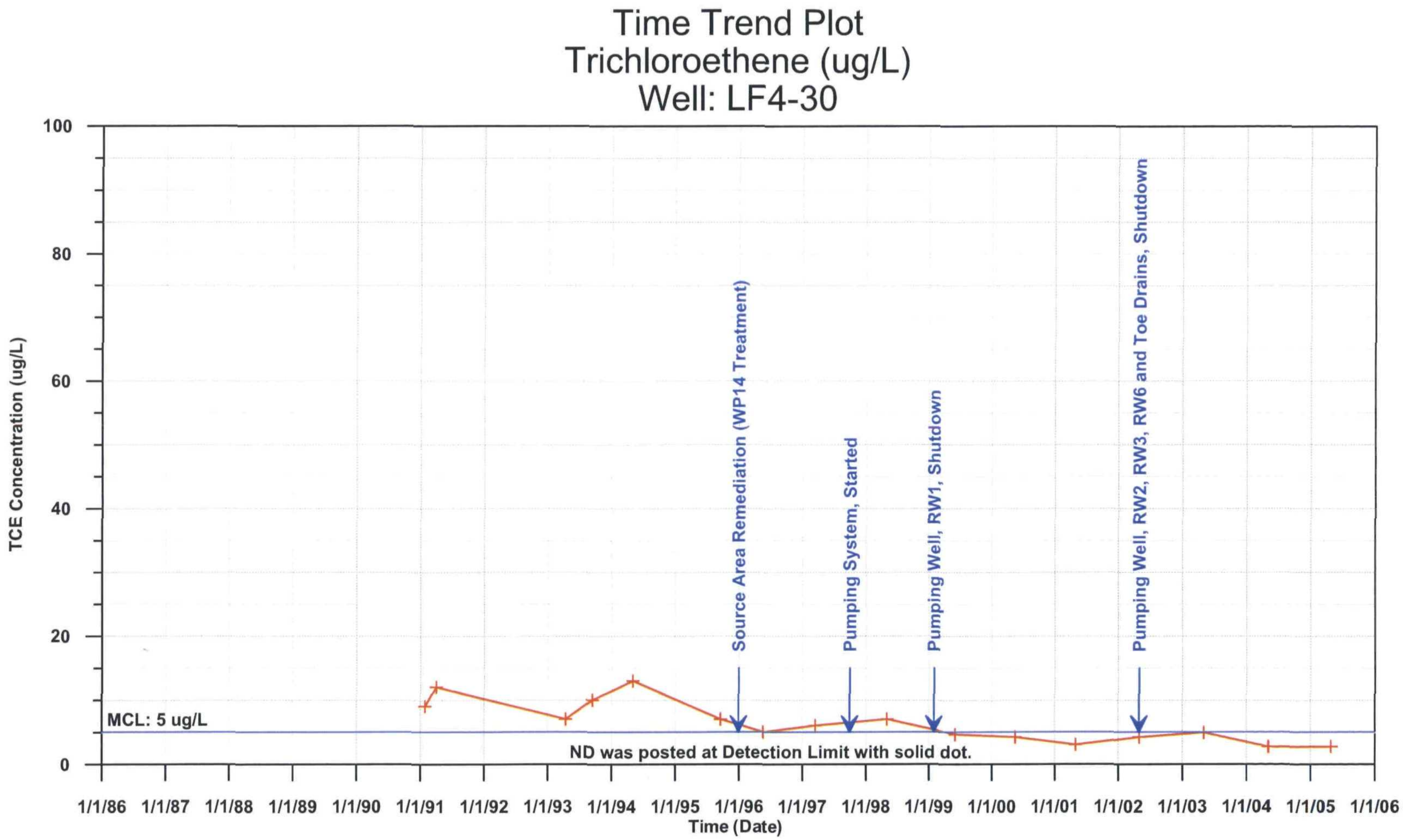


Time Trend Plot
Trichloroethene (ug/L)
Well: LF4-27
1,000
800
600
400
200
0
TCE Concentration (ug/L)
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)

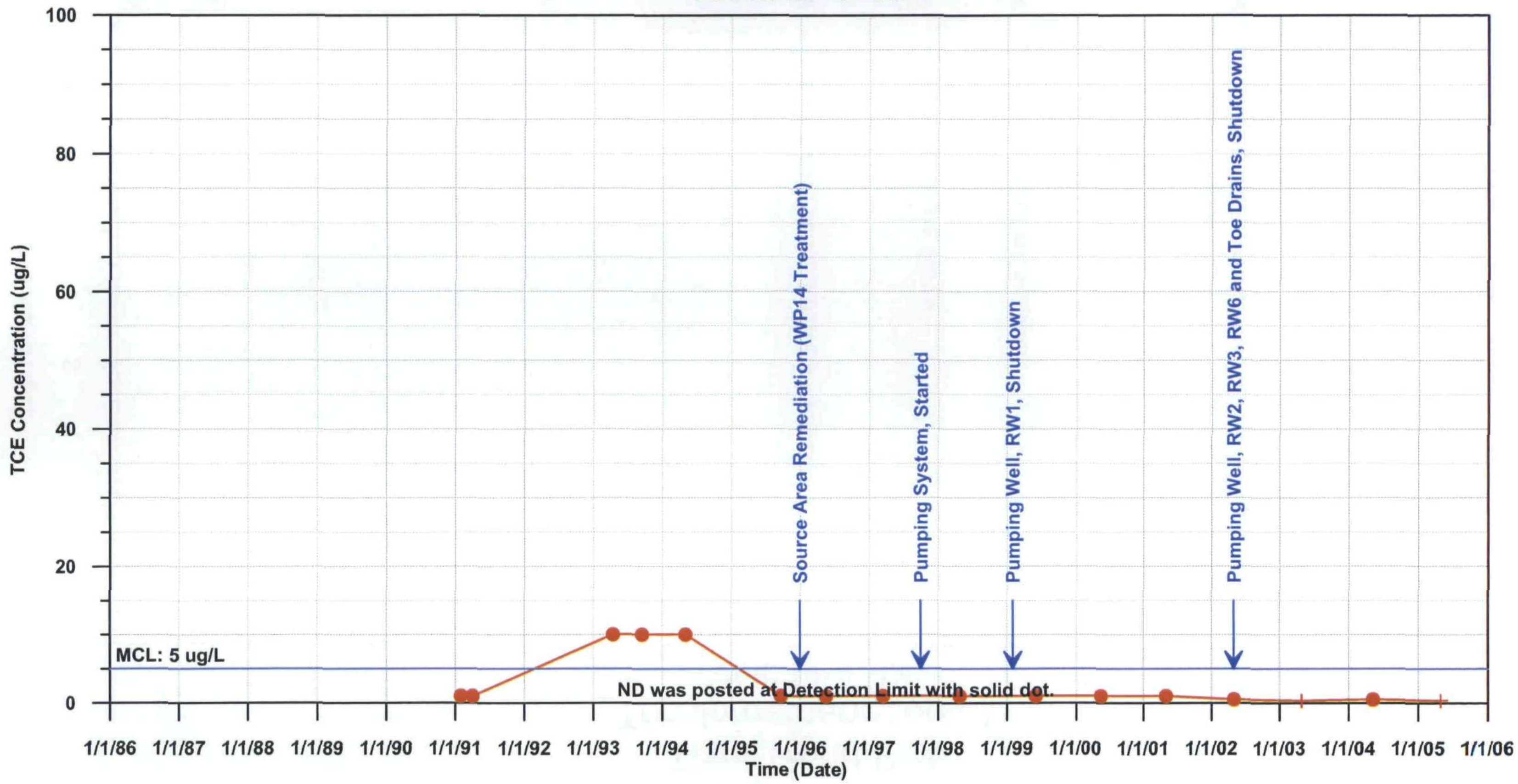

Time Trend Plot
Trichloroethene (ug/L)
Well: LF4-28
TCE Concentration (ug/L)
100
80
60
40
20
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)

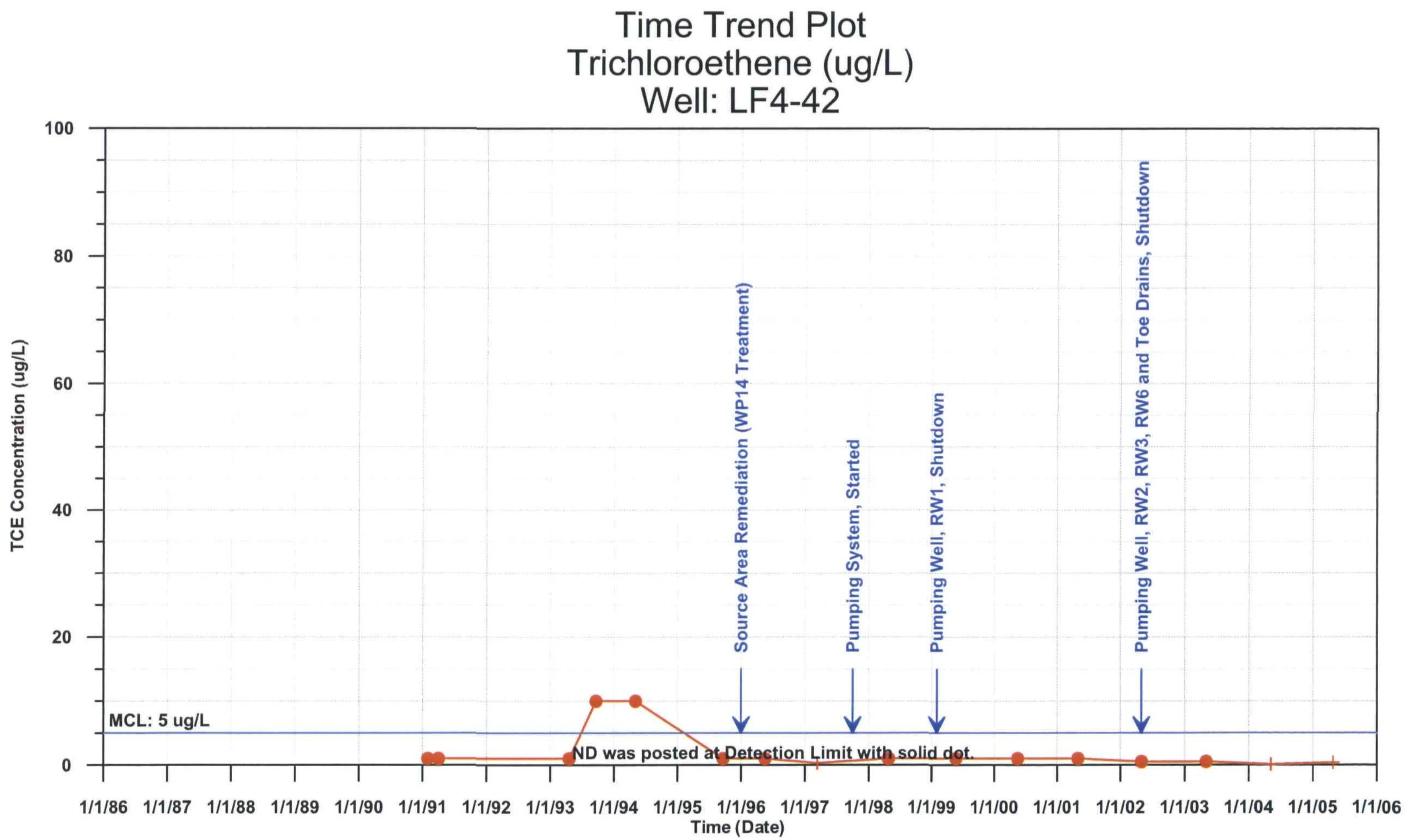


Time Trend Plot
Trichloroethene (ug/L)
Well: LF4-29
TCE Concentration (ug/L)
100
80
60
40
20
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86
1/1/87
1/1/88
1/1/89
1/1/90
1/1/91
1/1/92
1/1/93
1/1/94
1/1/95
1/1/96
1/1/97
1/1/98
1/1/99
1/1/00
1/1/01
1/1/02
1/1/03
1/1/04
1/1/05
1/1/06
Time (Date)

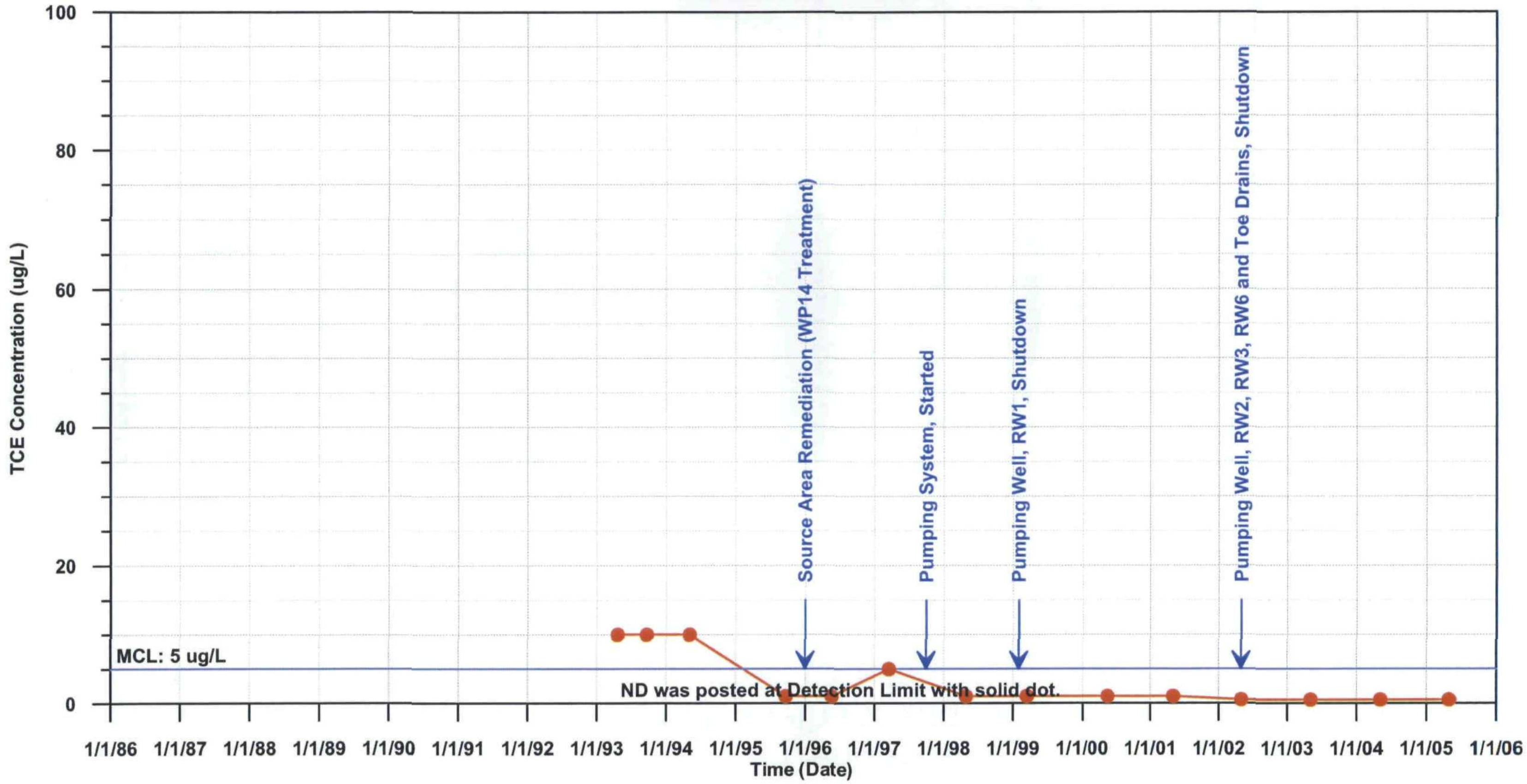

Time Trend Plot
Trichloroethene (ug/L)
Well: LF4-30
TCE Concentration (ug/L)
100
80
60
40
20
0
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
1/1/86
1/1/87
1/1/88
1/1/89
1/1/90
1/1/91
1/1/92
1/1/93
1/1/94
1/1/95
1/1/96
1/1/97
1/1/98
1/1/99
1/1/00
1/1/01
1/1/02
1/1/03
1/1/04
1/1/05
1/1/06
Time (Date)

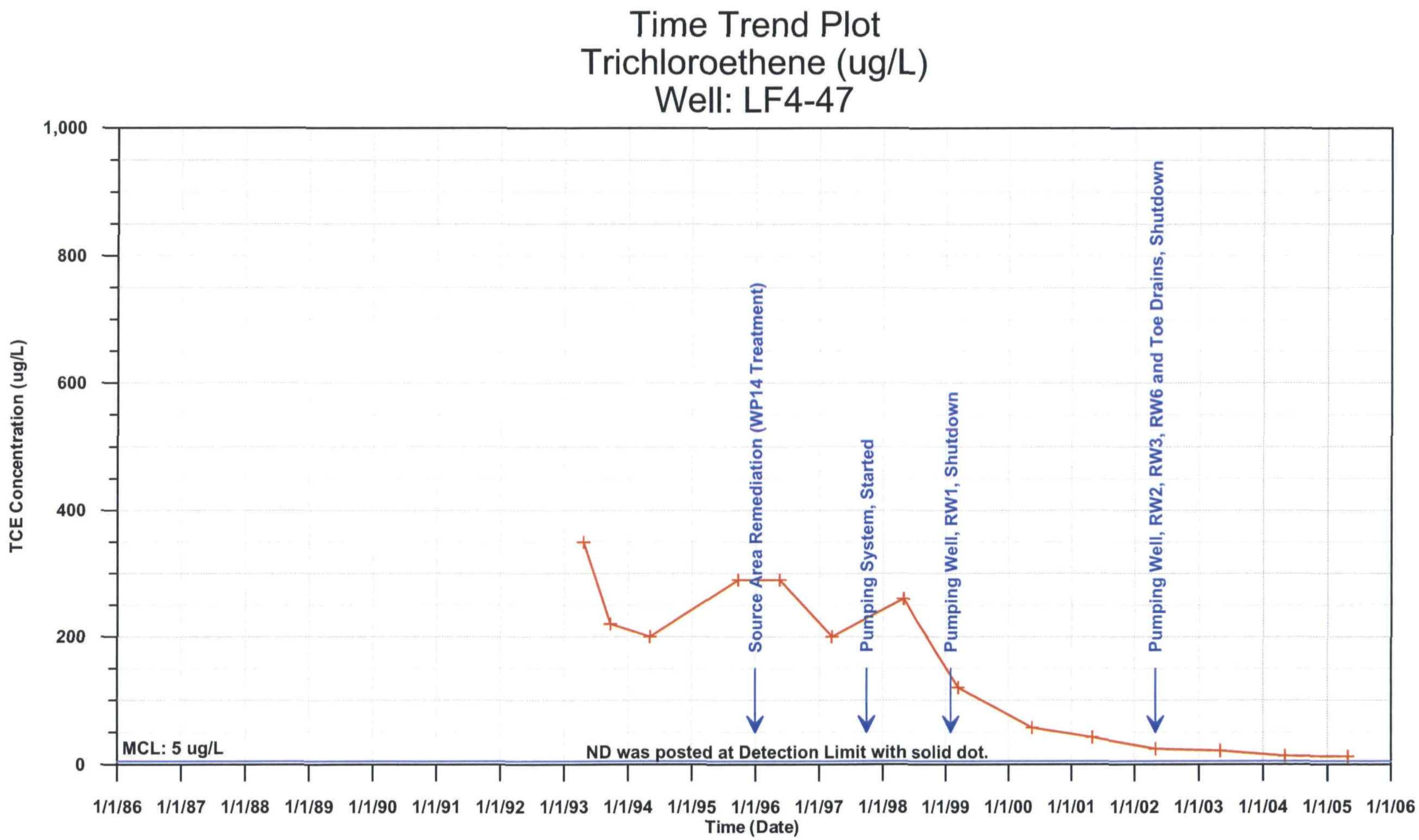
Time Trend Plot
Trichloroethene (ug/L)
Well: LF4-40




Time Trend Plot
Trichloroethene (ug/L)
Well: LF4-42
TCE Concentration (ug/L)
100
80
60
40
20
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)

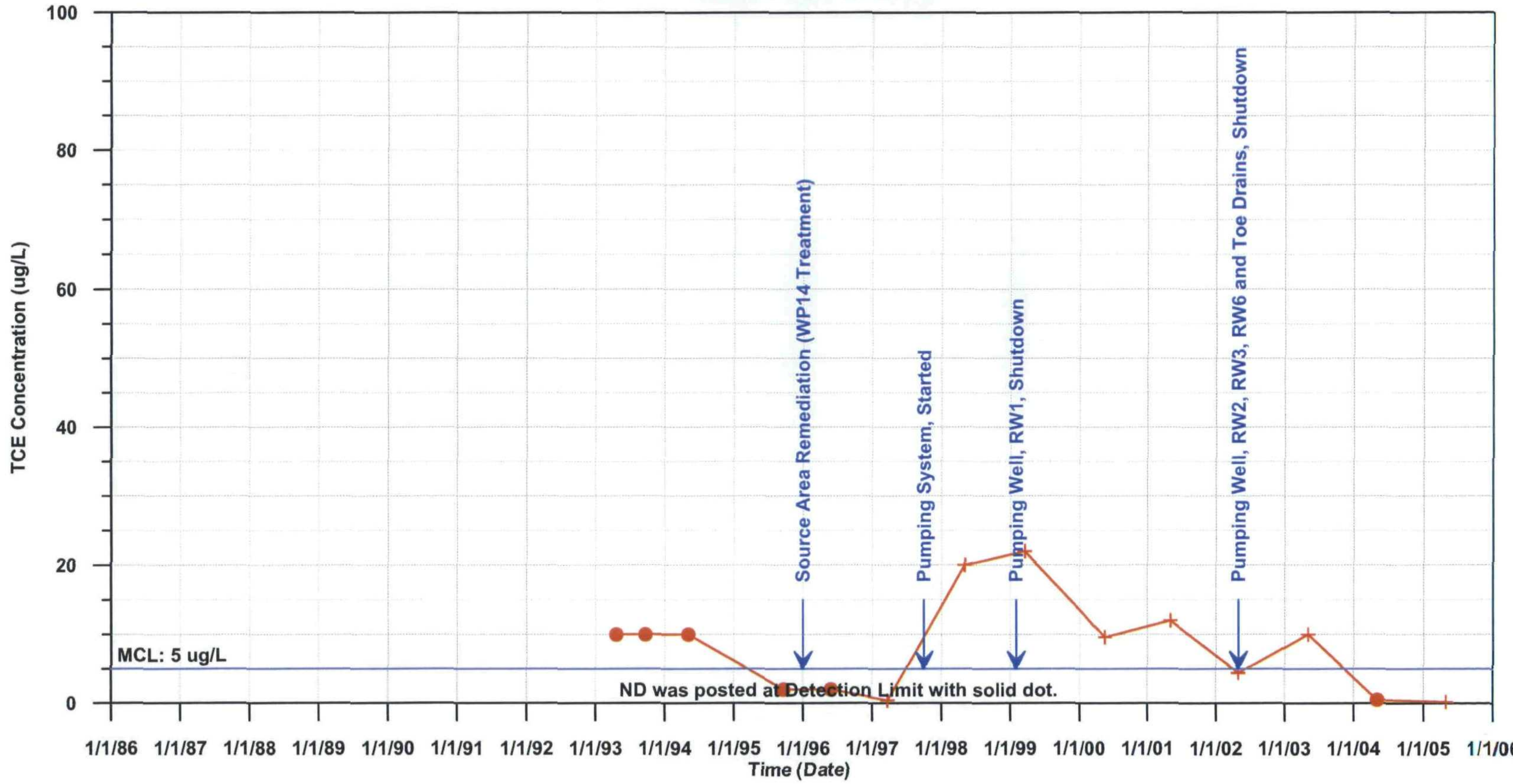
Time Trend Plot
Trichloroethene (ug/L)
Well: LF4-46

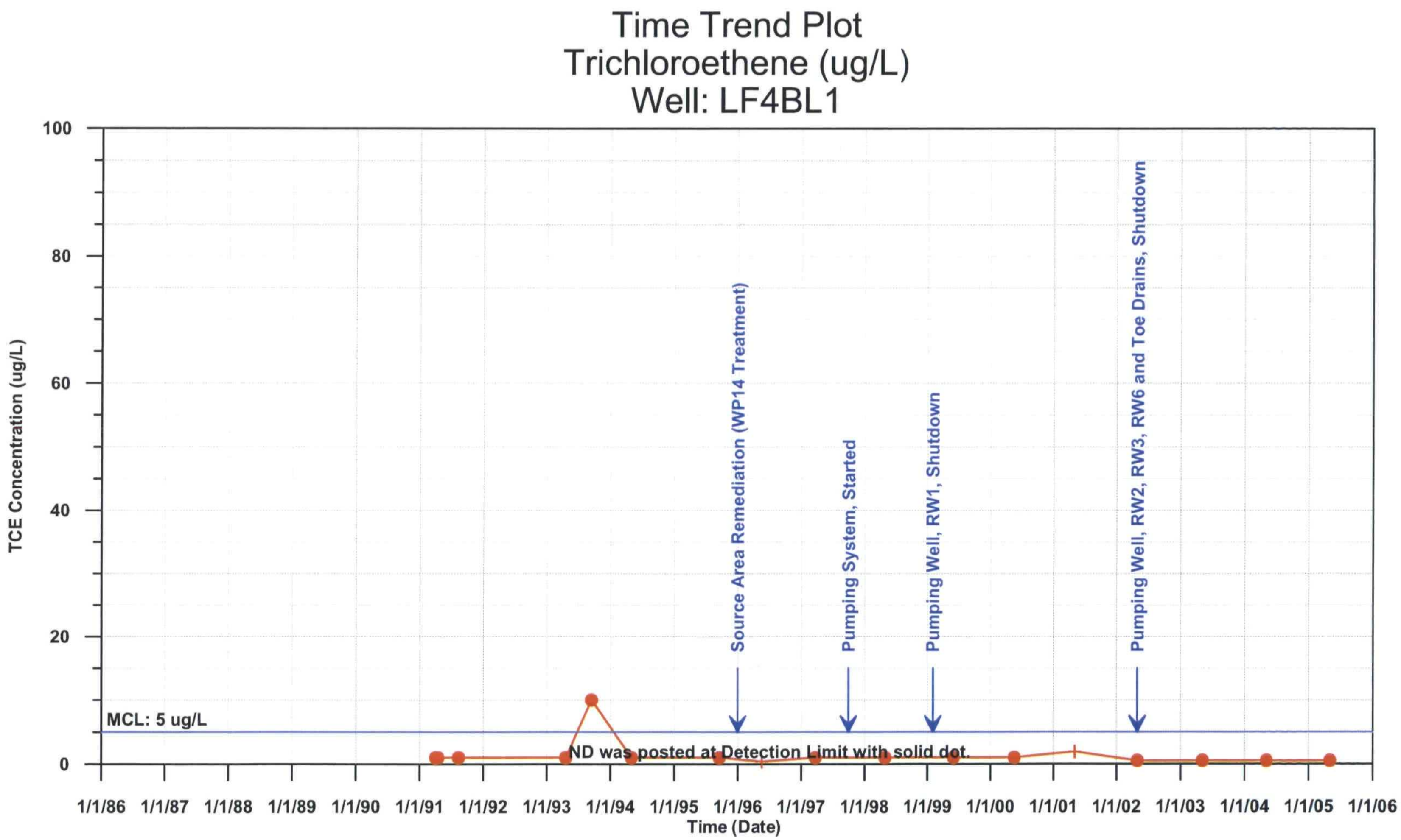




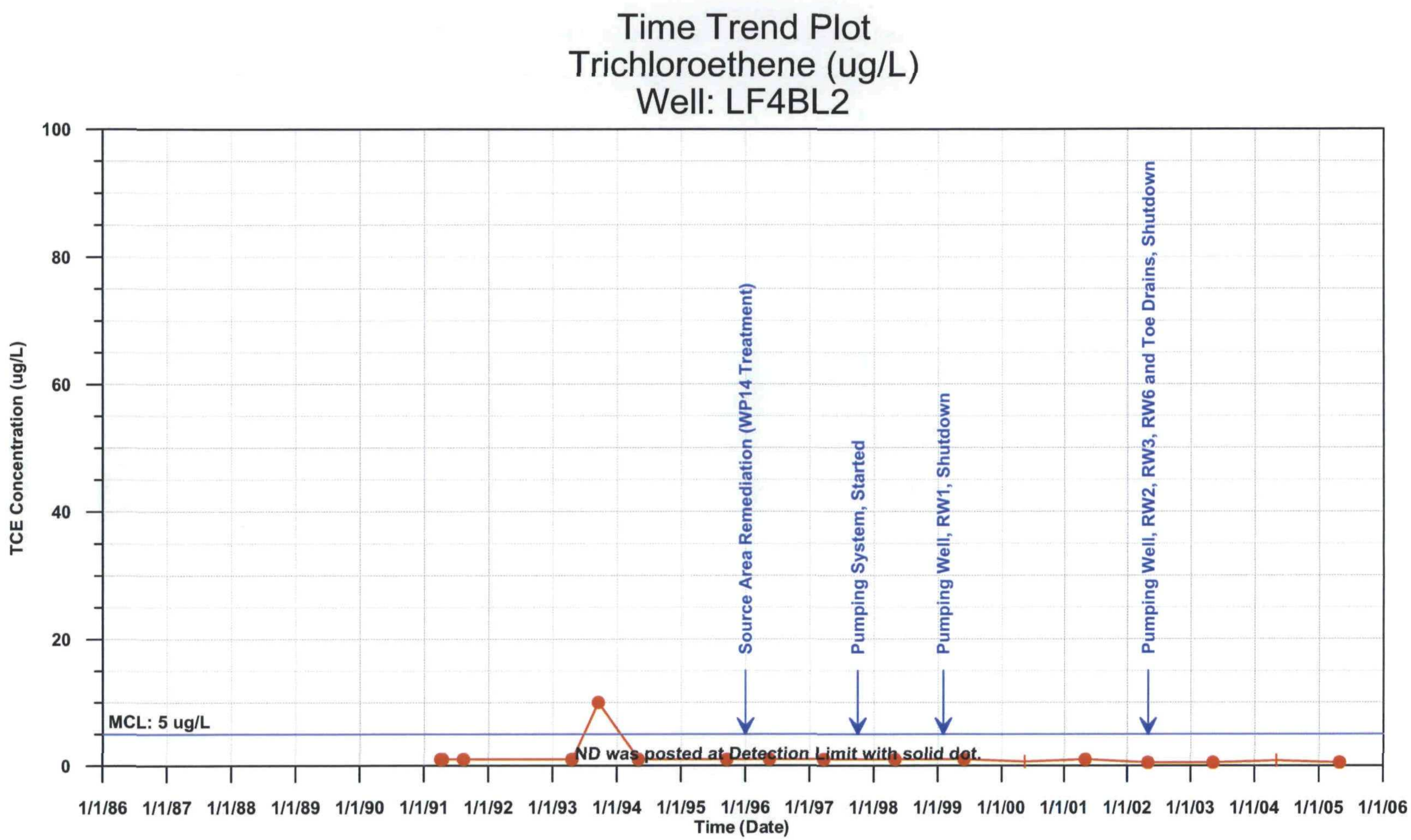
Time Trend Plot
Trichloroethene (ug/L)
Well: LF4-47
TCE Concentration (ug/L)
1,000
800
600
400
200
0
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)

Time Trend Plot
Trichloroethene (ug/L)
Well: LF4-48

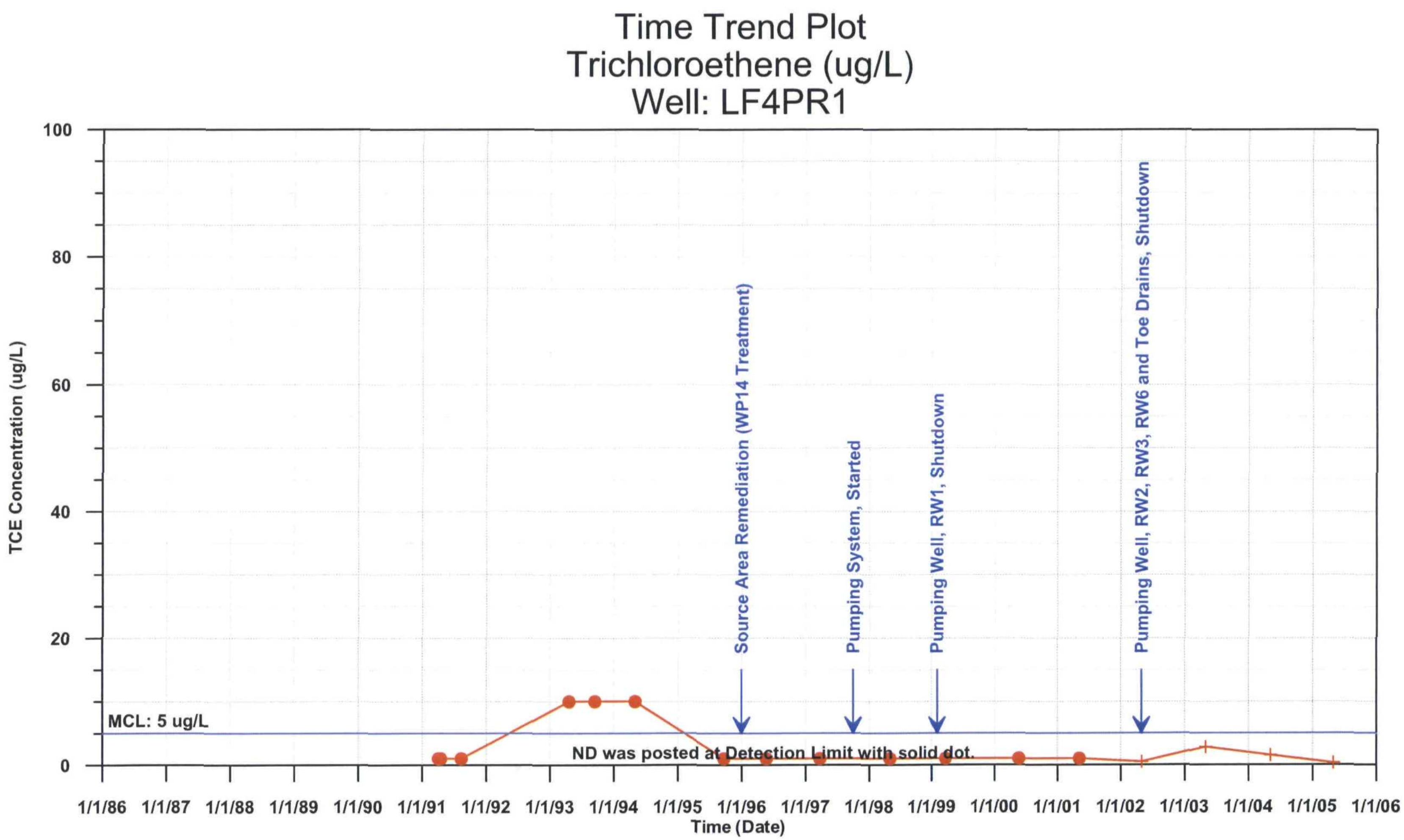




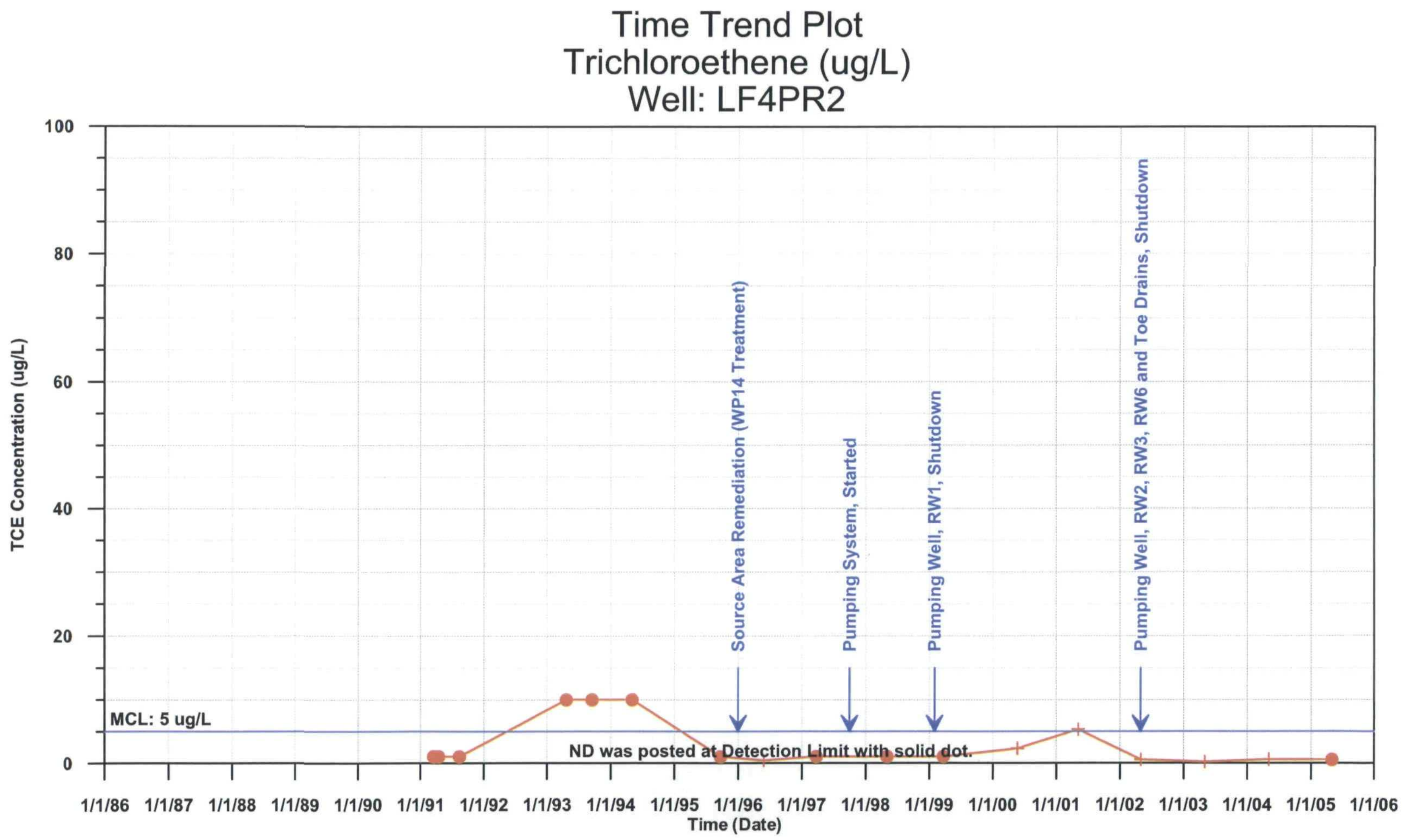
Time Trend Plot
Trichloroethene (ug/L)
Well: LF4BL1
TCE Concentration (ug/L)
100
80
60
40
20
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)



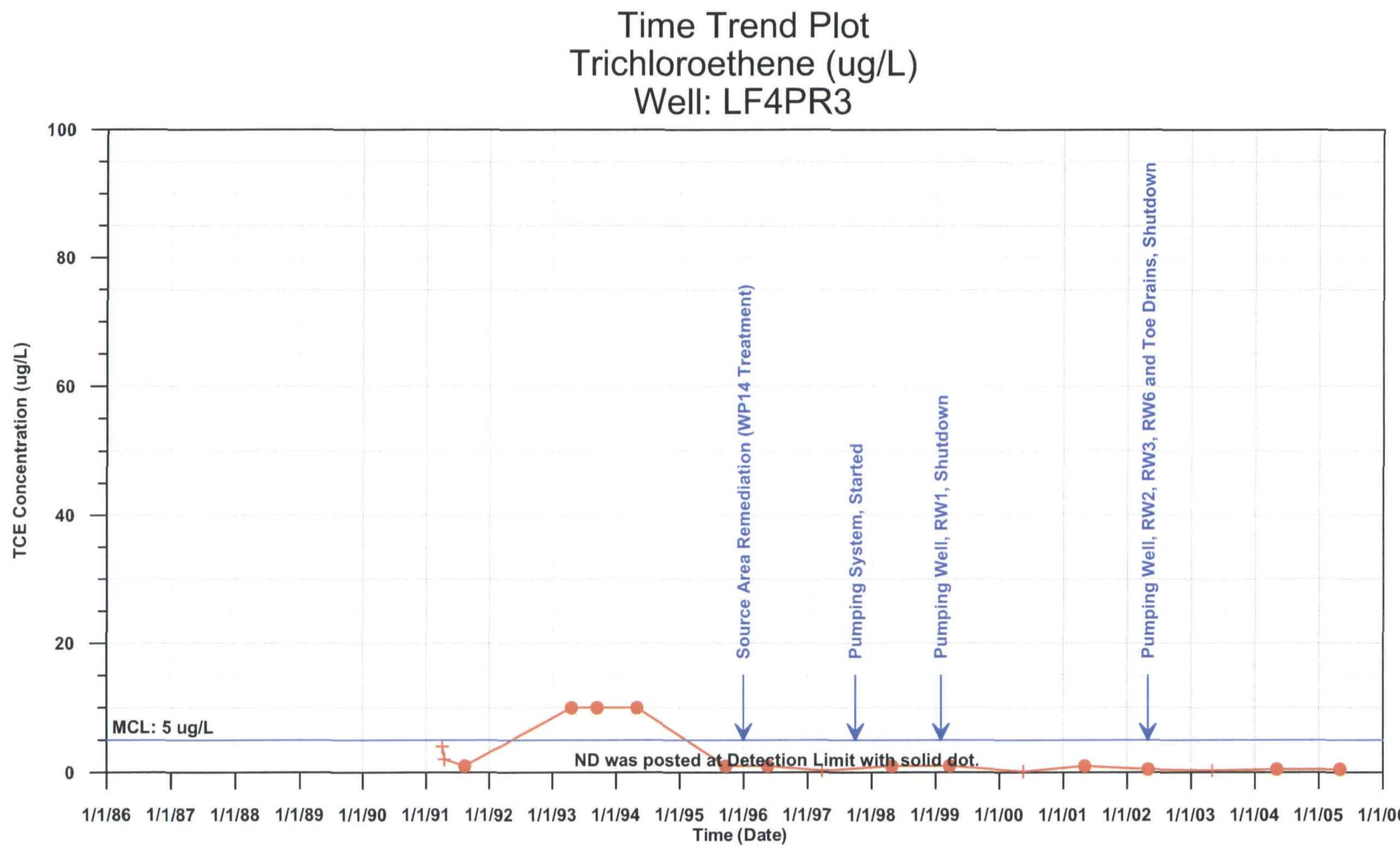
Time Trend Plot
Trichloroethene (ug/L)
Well: LF4BL2
TCE Concentration (ug/L)
100
80
60
40
20
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)



Time Trend Plot
Trichloroethene (ug/L)
Well: LF4PR1
TCE Concentration (ug/L)
100
80
60
40
20
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86
1/1/87
1/1/88
1/1/89
1/1/90
1/1/91
1/1/92
1/1/93
1/1/94
1/1/95
1/1/96
1/1/97
1/1/98
1/1/99
1/1/00
1/1/01
1/1/02
1/1/03
1/1/04
1/1/05
1/1/06
Time (Date)

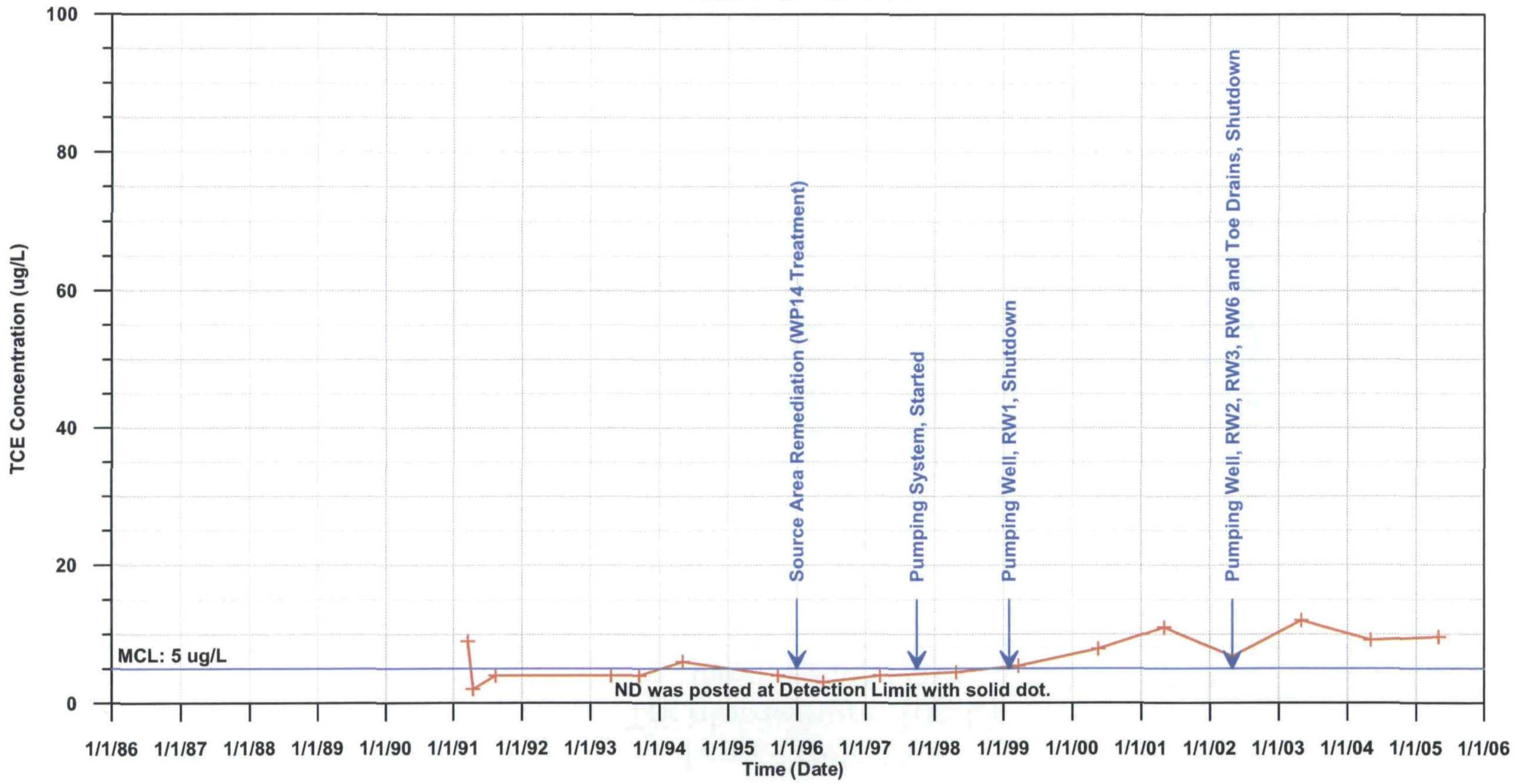


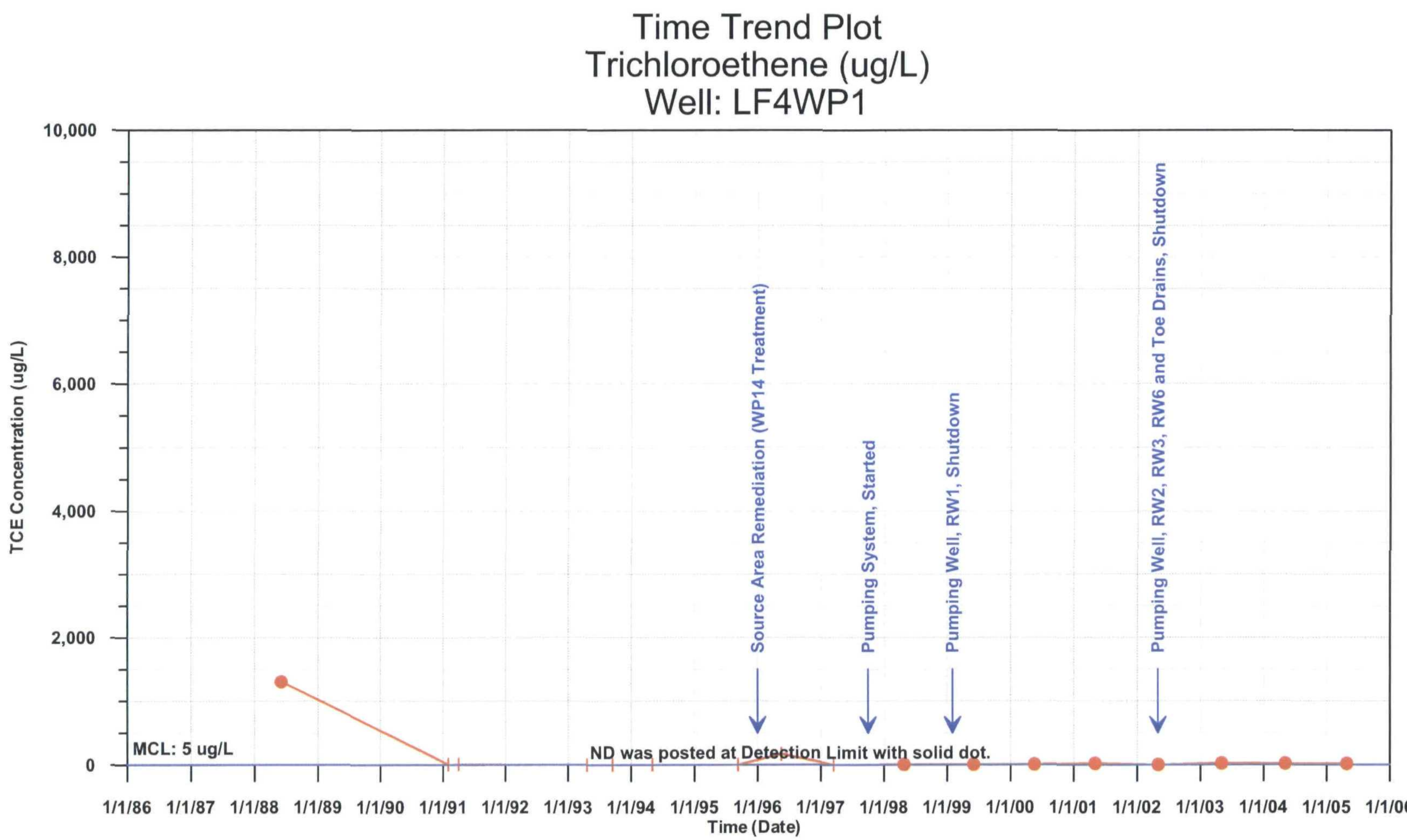
Time Trend Plot
Trichloroethene (ug/L)
Well: LF4PR2
TCE Concentration (ug/L)
100
80
60
40
20
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)



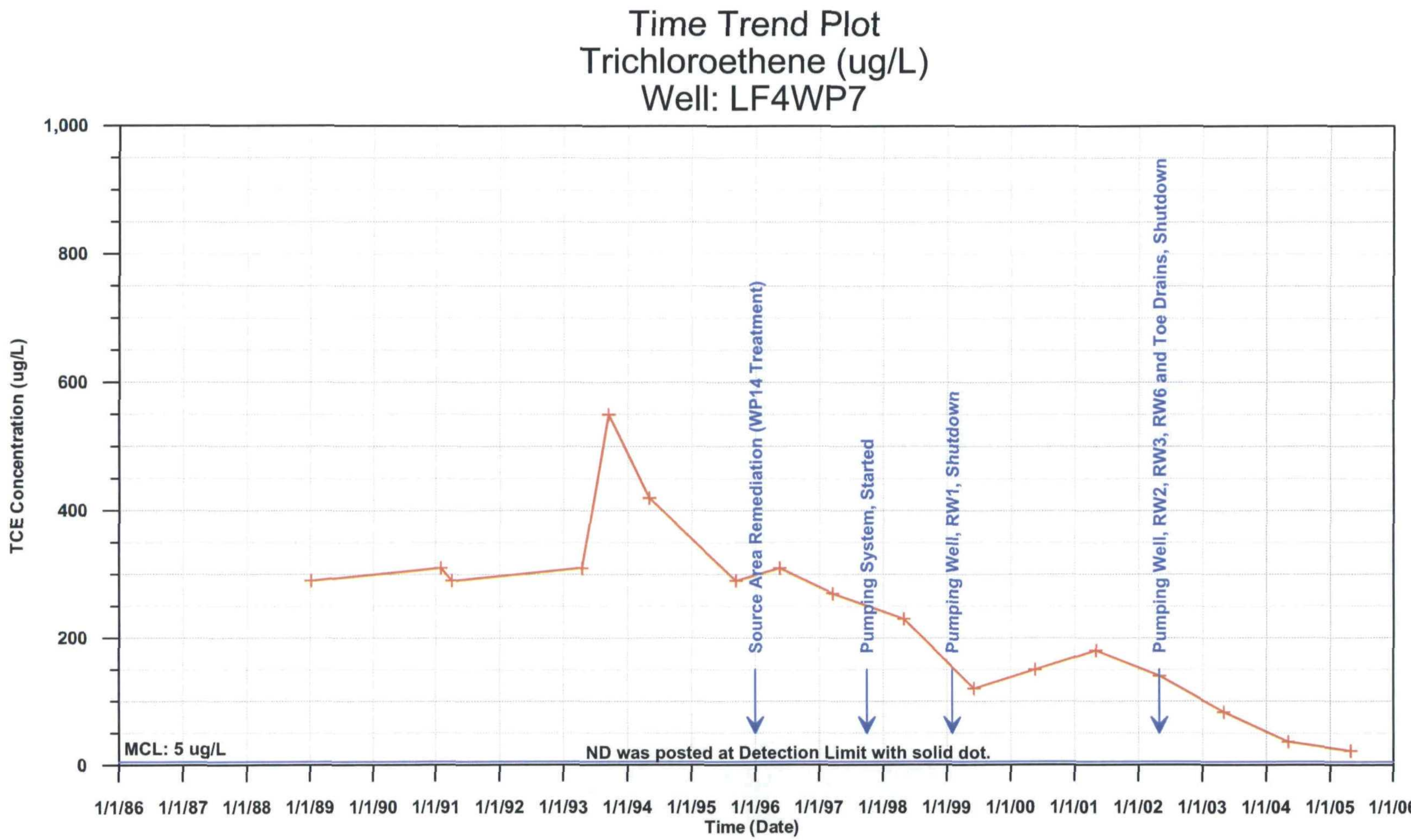
Time Trend Plot
Trichloroethene (ug/L)
Well: LF4PR3
TCE Concentration (ug/L)
100
80
60
40
20
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)

Time Trend Plot
Trichloroethene (ug/L)
Well: LF4PR4

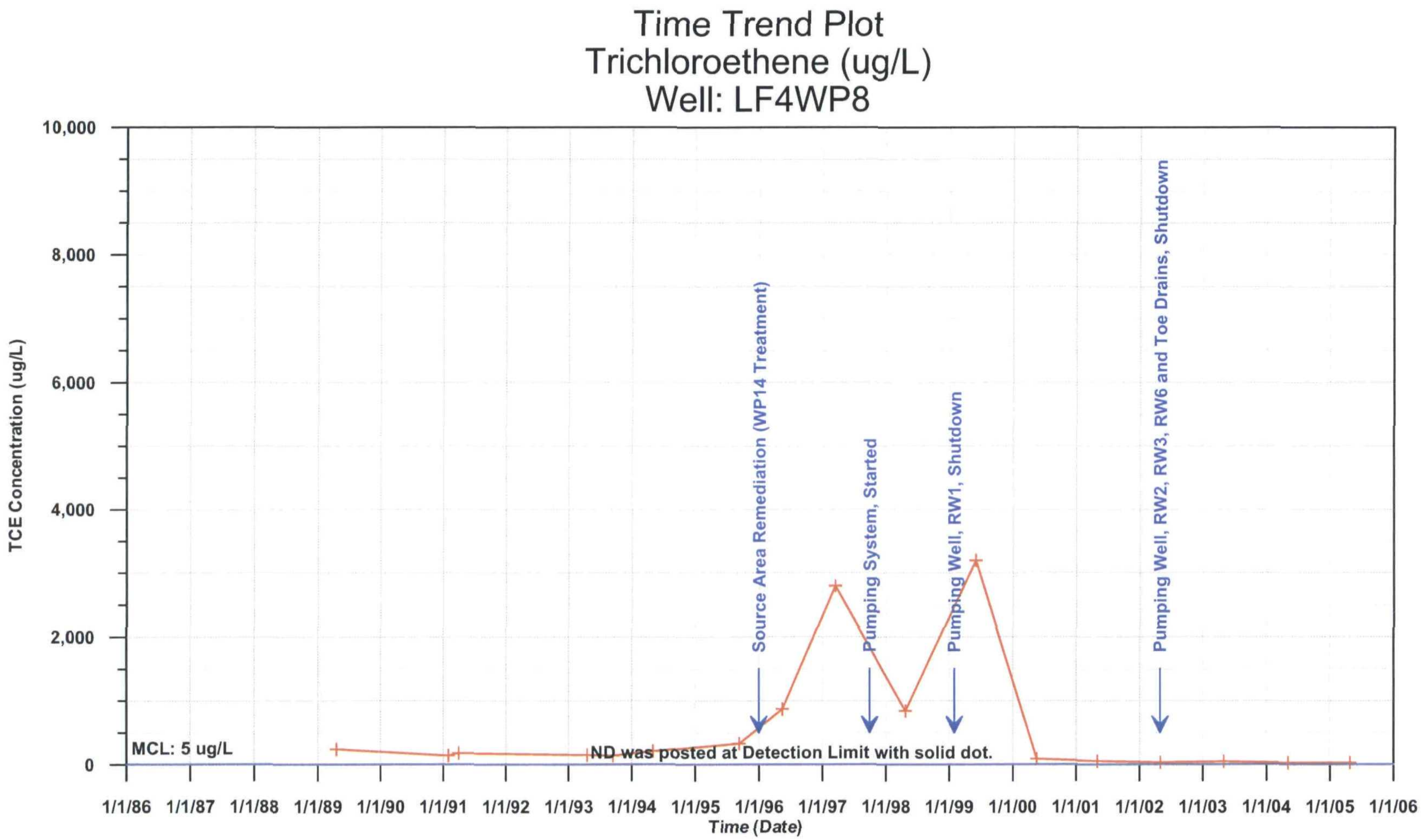




Time Trend Plot
Trichloroethene (ug/L)
Well: LF4WP1
10,000
8,000
6,000
4,000
2,000
0
TCE Concentration (ug/L)
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86
1/1/87
1/1/88
1/1/89
1/1/90
1/1/91
1/1/92
1/1/93
1/1/94
1/1/95
1/1/96
1/1/97
1/1/98
1/1/99
1/1/00
1/1/01
1/1/02
1/1/03
1/1/04
1/1/05
1/1/06
Time (Date)



Time Trend Plot
Trichloroethene (ug/L)
Well: LF4WP7
1,000
800
600
400
200
0
TCE Concentration (ug/L)
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)



Time Trend Plot
Trichloroethene (ug/L)
Well: LF4WP8
TCE Concentration (ug/L)
10,000
8,000
6,000
4,000
2,000
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86
1/1/87
1/1/88
1/1/89
1/1/90
1/1/91
1/1/92
1/1/93
1/1/94
1/1/95
1/1/96
1/1/97
1/1/98
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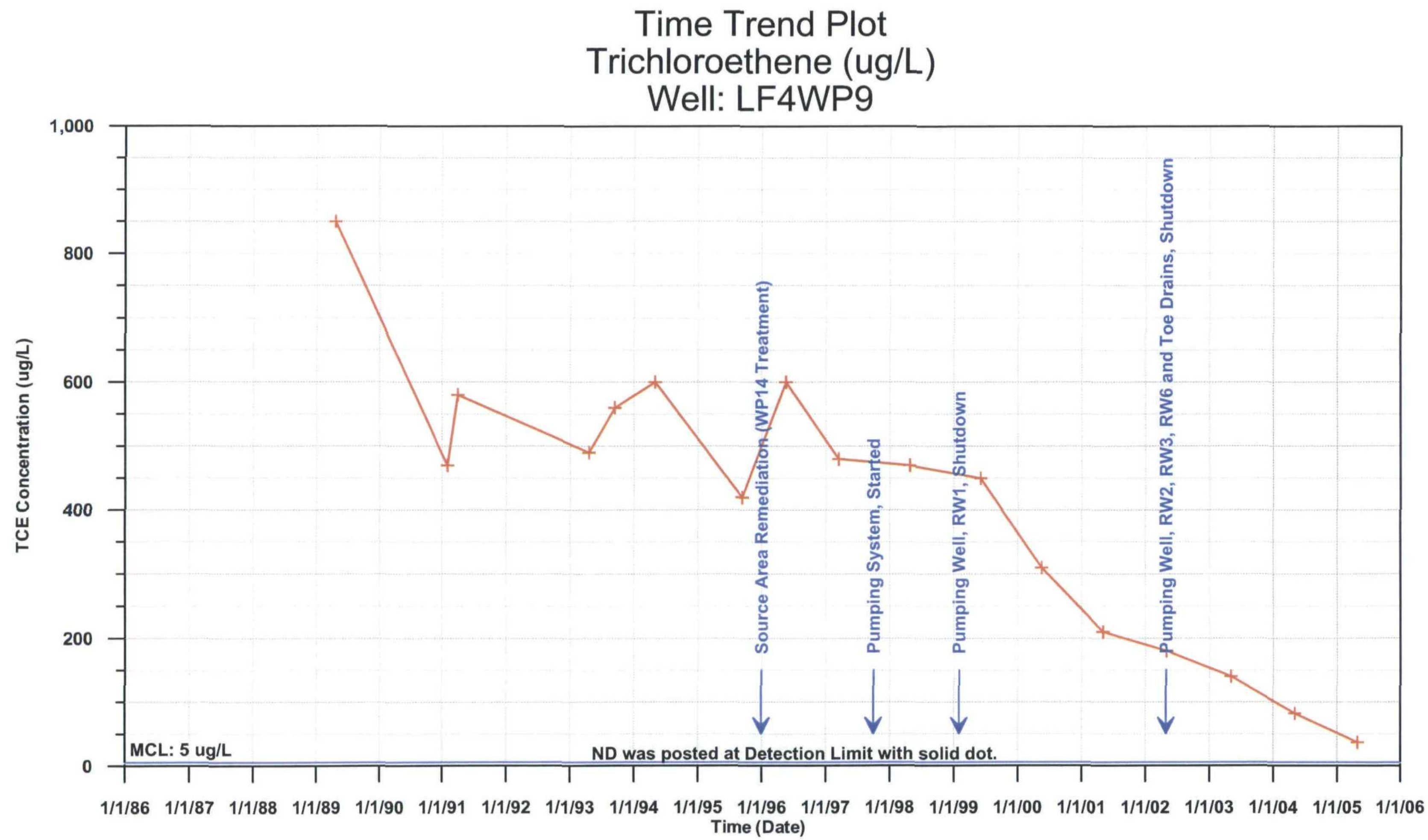
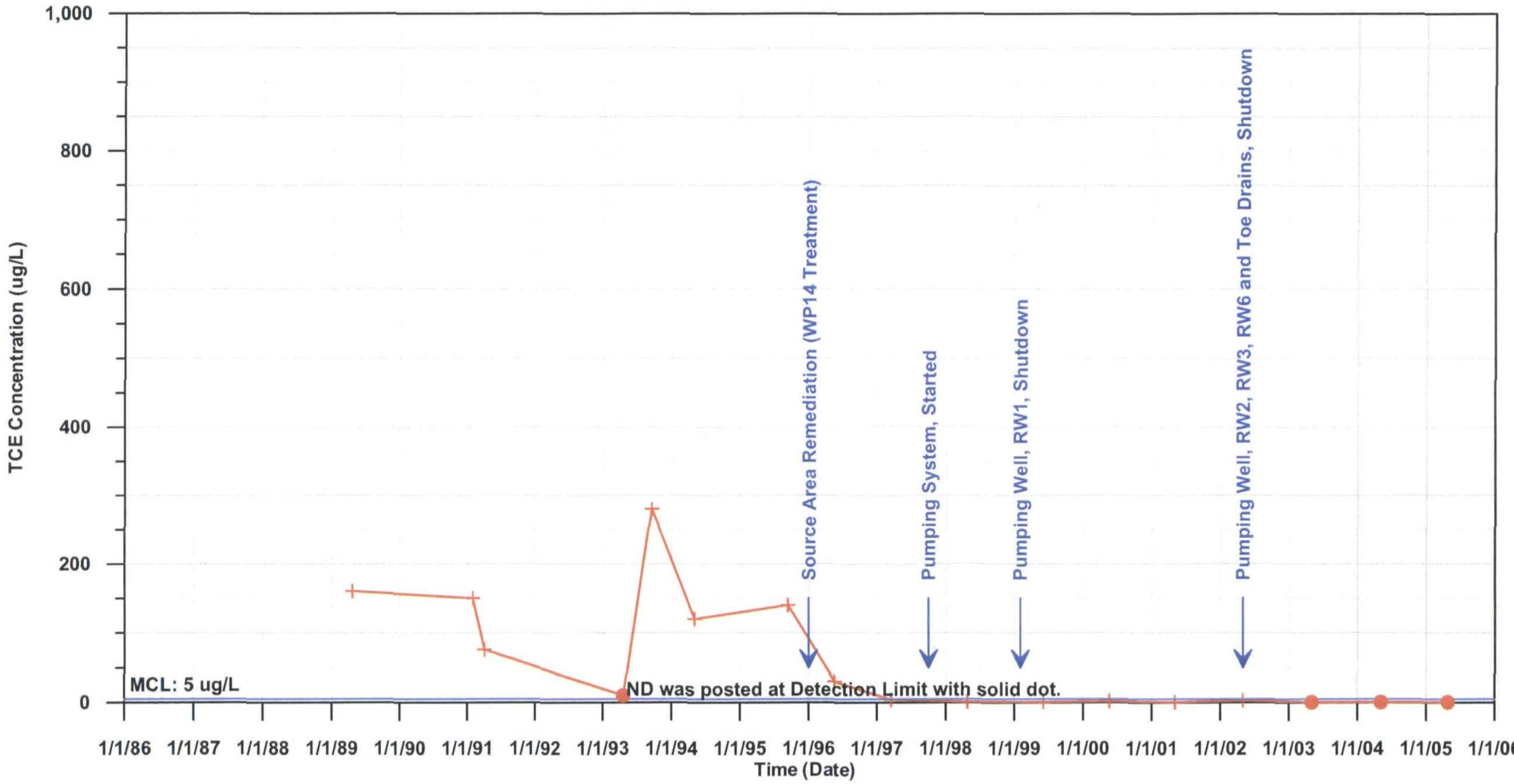
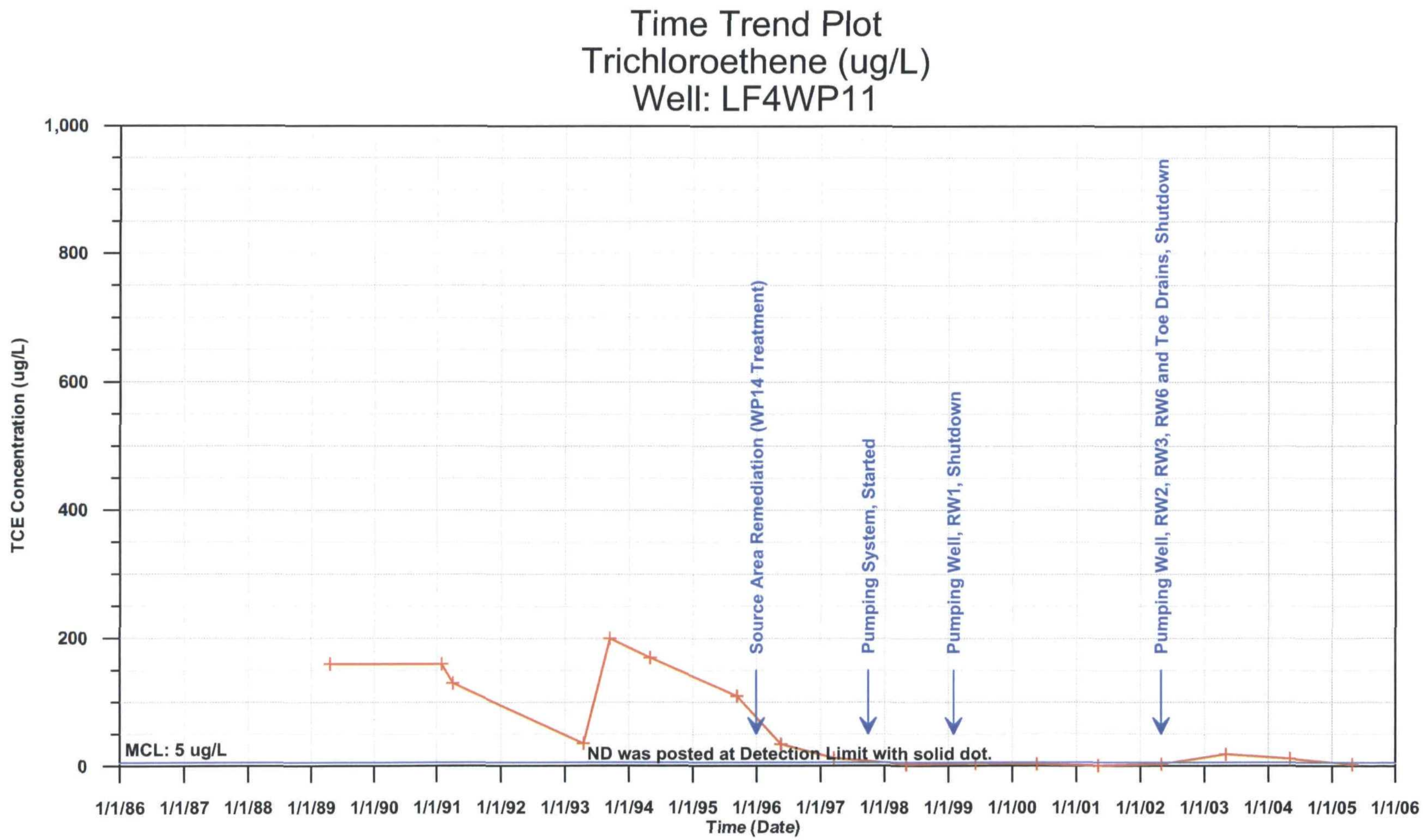
1/1/04
1/1/05
1/1/06
Time (Date)

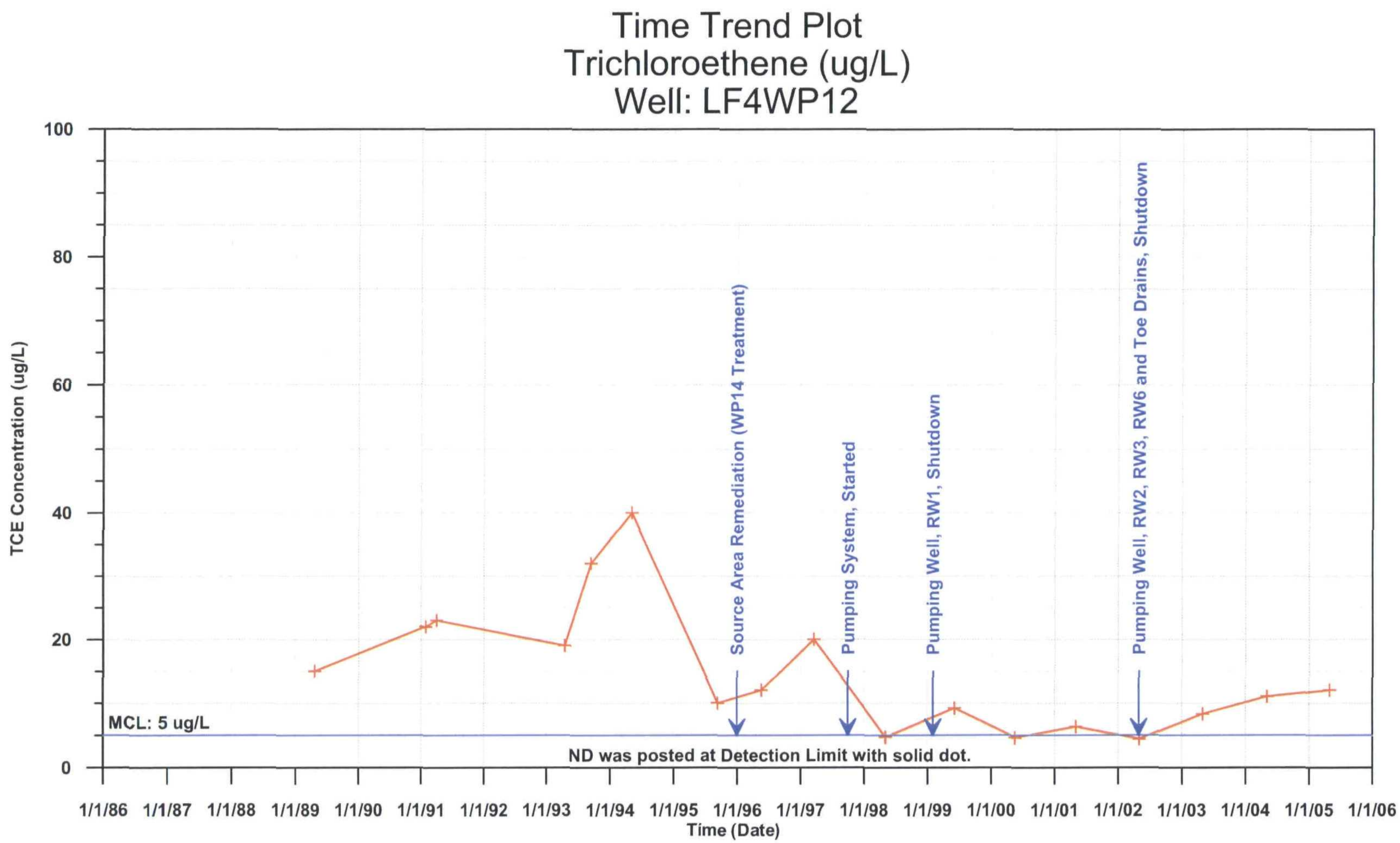


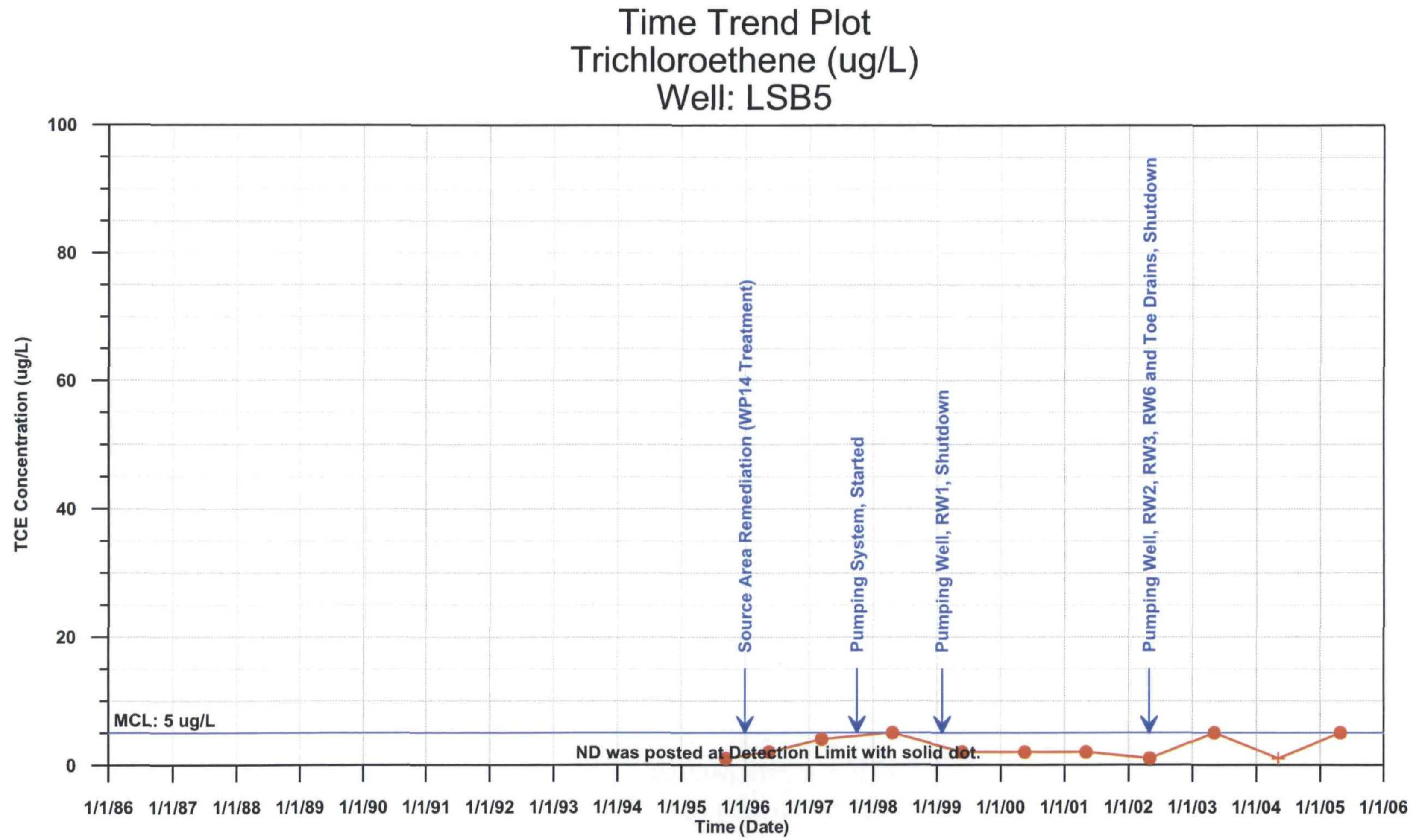
Time Trend Plot
Trichloroethene (ug/L)
Well: LF4WP9
TCE Concentration (ug/L)
1,000
800
600
400
200
0
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)

Time Trend Plot
Trichloroethene (ug/L)
Well: LF4WP10

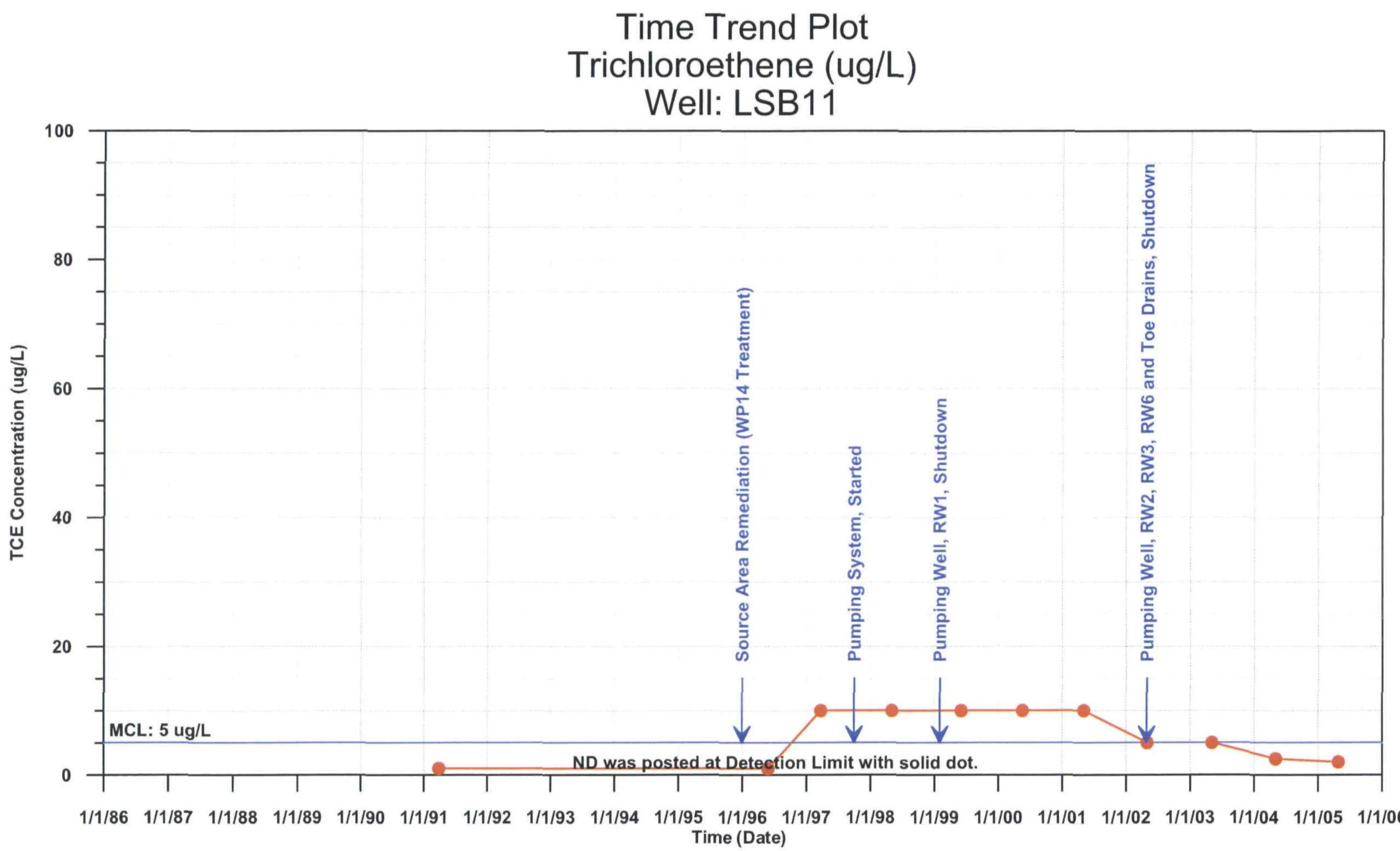



Time Trend Plot
Trichloroethene (ug/L)
Well: LF4WP11
1,000
800
600
400
200
0
TCE Concentration (ug/L)
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
1/1/86
1/1/87
1/1/88
1/1/89
1/1/90
1/1/91
1/1/92
1/1/93
1/1/94
1/1/95
1/1/96
1/1/97
1/1/98
1/1/99
1/1/00
1/1/01
1/1/02
1/1/03
1/1/04
1/1/05
1/1/06
Time (Date)

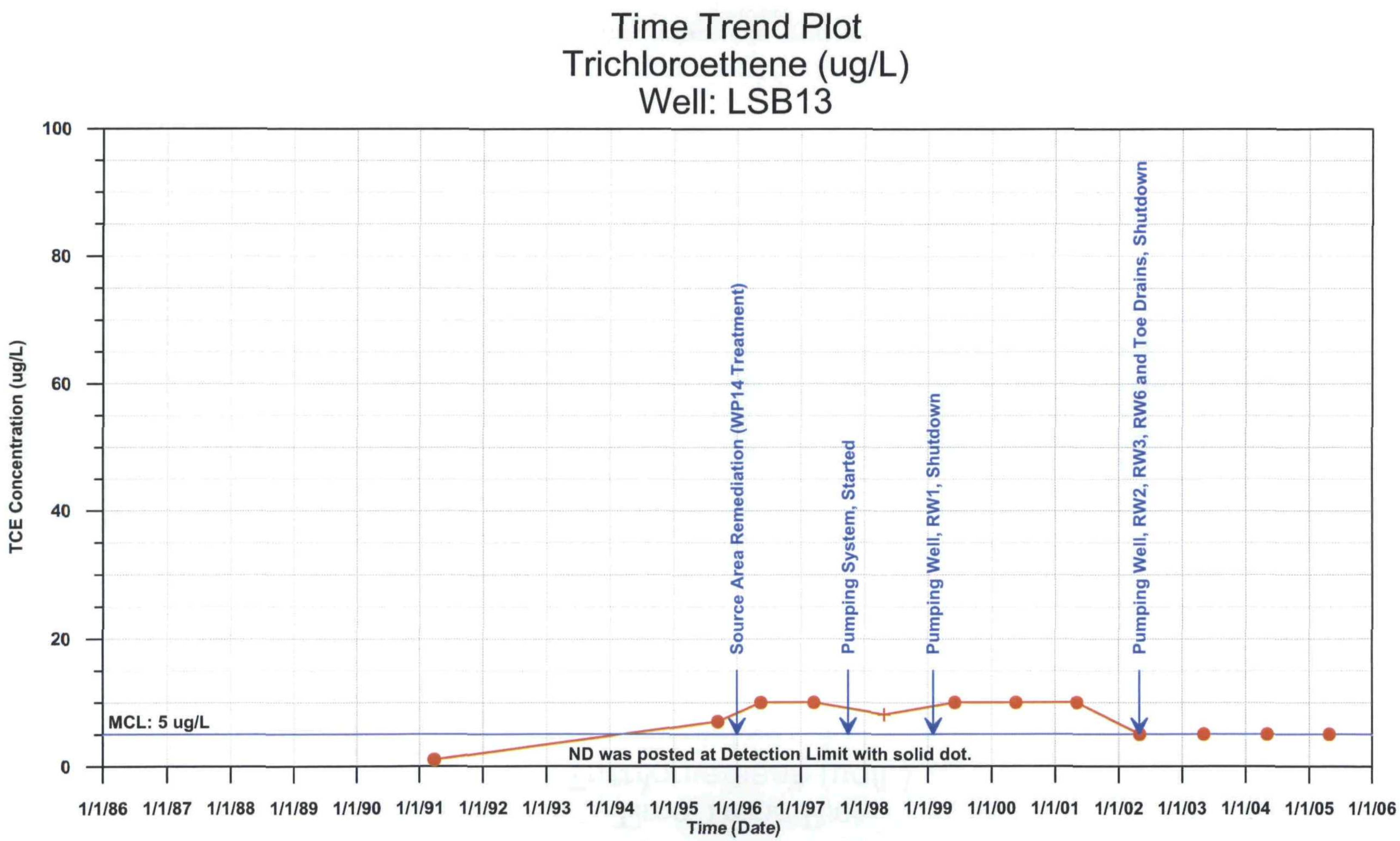

Time Trend Plot
Trichloroethene (ug/L)
Well: LF4WP12
TCE Concentration (ug/L)
100
80
60
40
20
0
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)

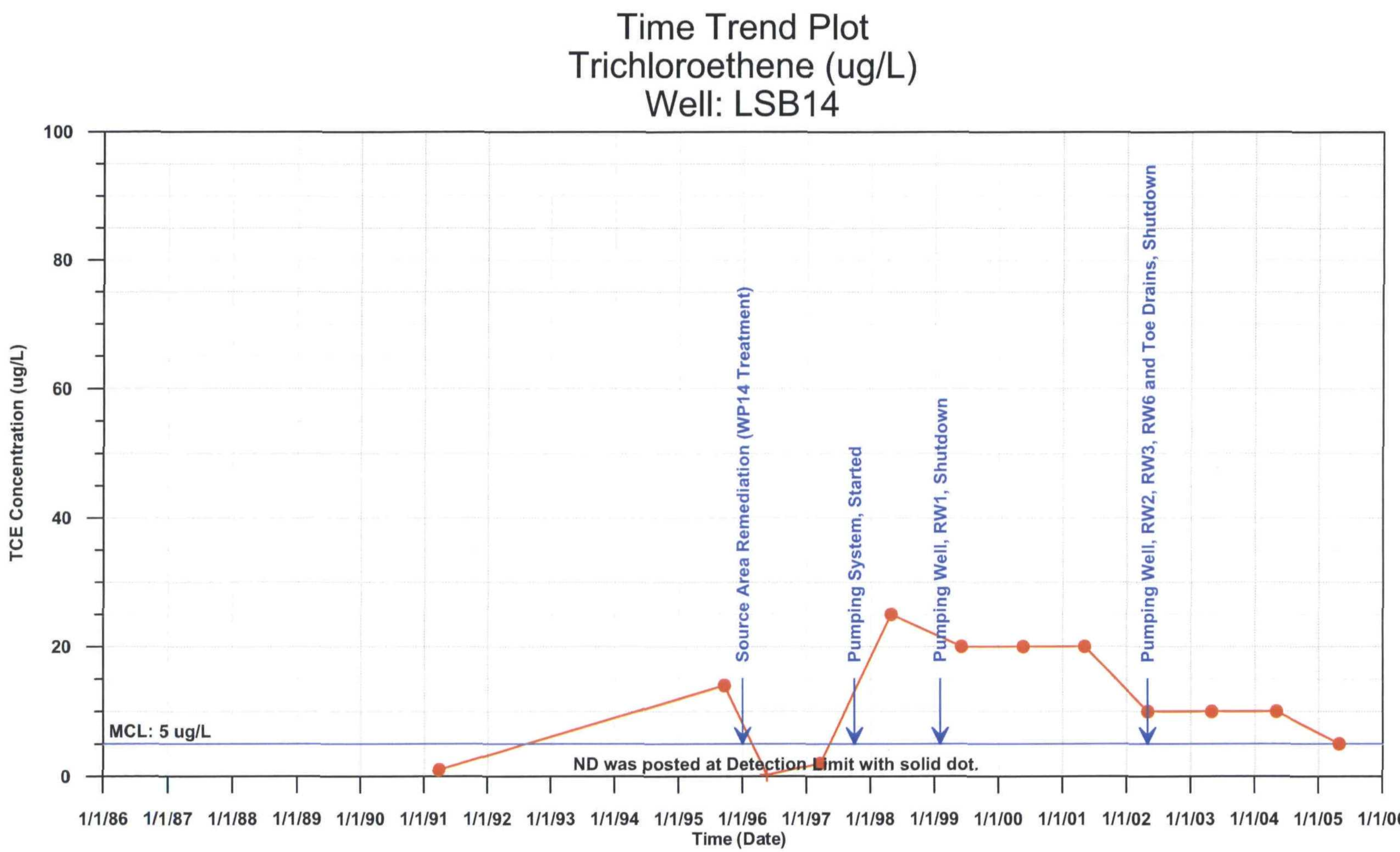


Time Trend Plot
Trichloroethene (ug/L)
Well: LSB5
TCE Concentration (ug/L)
100
80
60
40
20
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86
1/1/87
1/1/88
1/1/89
1/1/90
1/1/91
1/1/92
1/1/93
1/1/94
1/1/95
1/1/96
1/1/97
1/1/98
1/1/99
1/1/00
1/1/01
1/1/02
1/1/03
1/1/04
1/1/05
1/1/06
Time (Date)

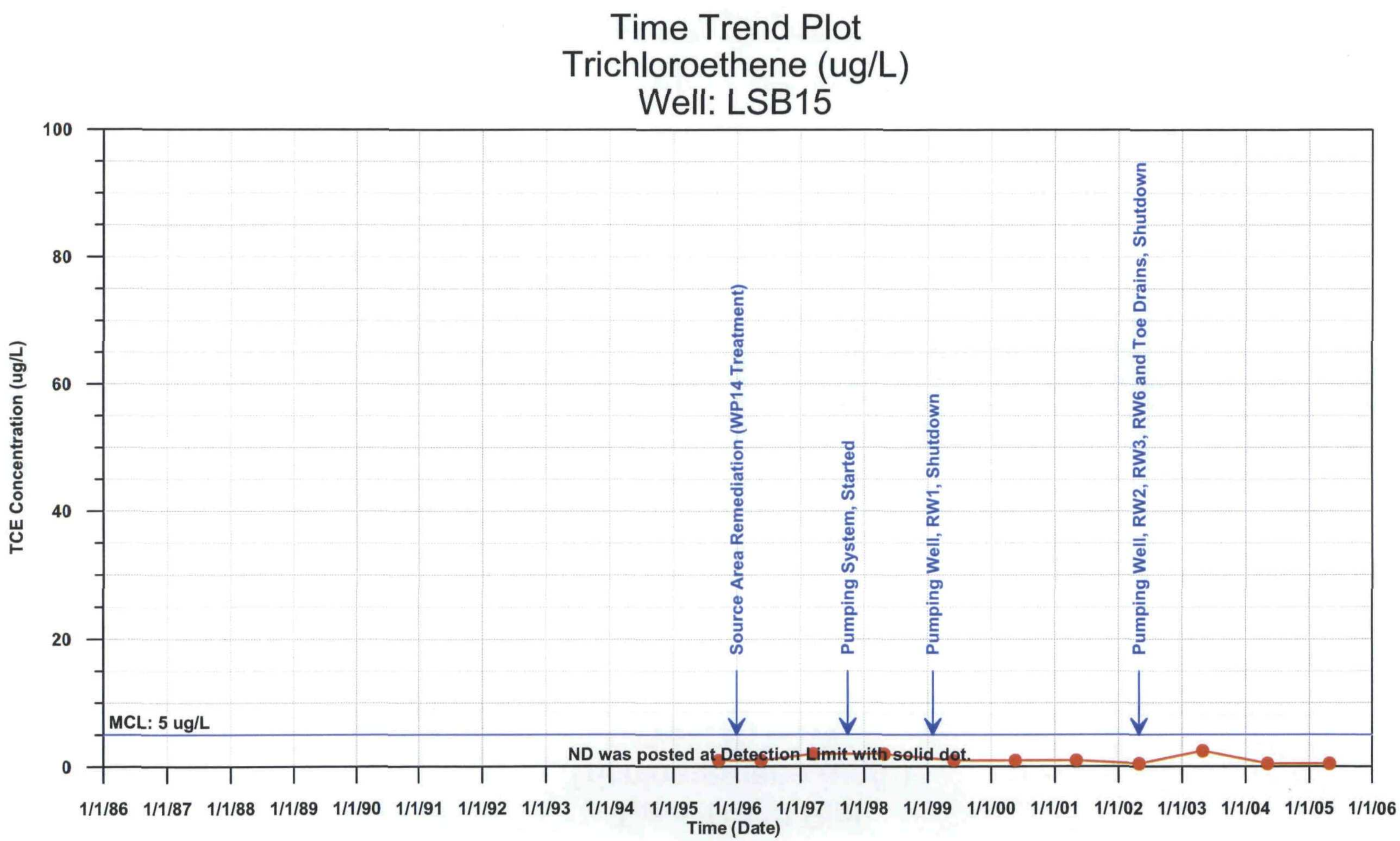


Time Trend Plot
Trichloroethene (ug/L)
Well: LSB11
TCE Concentration (ug/L)
100
80
60
40
20
0
MCL: 5 ug/L
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
ND was posted at Detection Limit with solid dot.
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)


Time Trend Plot
Trichloroethene (ug/L)
Well: LSB13
TCE Concentration (ug/L)
100
80
60
40
20
0
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
1/1/86
1/1/87
1/1/88
1/1/89
1/1/90
1/1/91
1/1/92
1/1/93
1/1/94
1/1/95
1/1/96
1/1/97
1/1/98
1/1/99
1/1/00
1/1/01
1/1/02
1/1/03
1/1/04
1/1/05
1/1/06
Time (Date)



Time Trend Plot
Trichloroethene (ug/L)
Well: LSB14
100
80
60
40
20
0
TCE Concentration (ug/L)
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)



Time Trend Plot
Trichloroethene (ug/L)
Well: LSB15
TCE Concentration (ug/L)
100
80
60
40
20
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86
1/1/87
1/1/88
1/1/89
1/1/90
1/1/91
1/1/92
1/1/93
1/1/94
1/1/95
1/1/96
1/1/97
1/1/98
1/1/99
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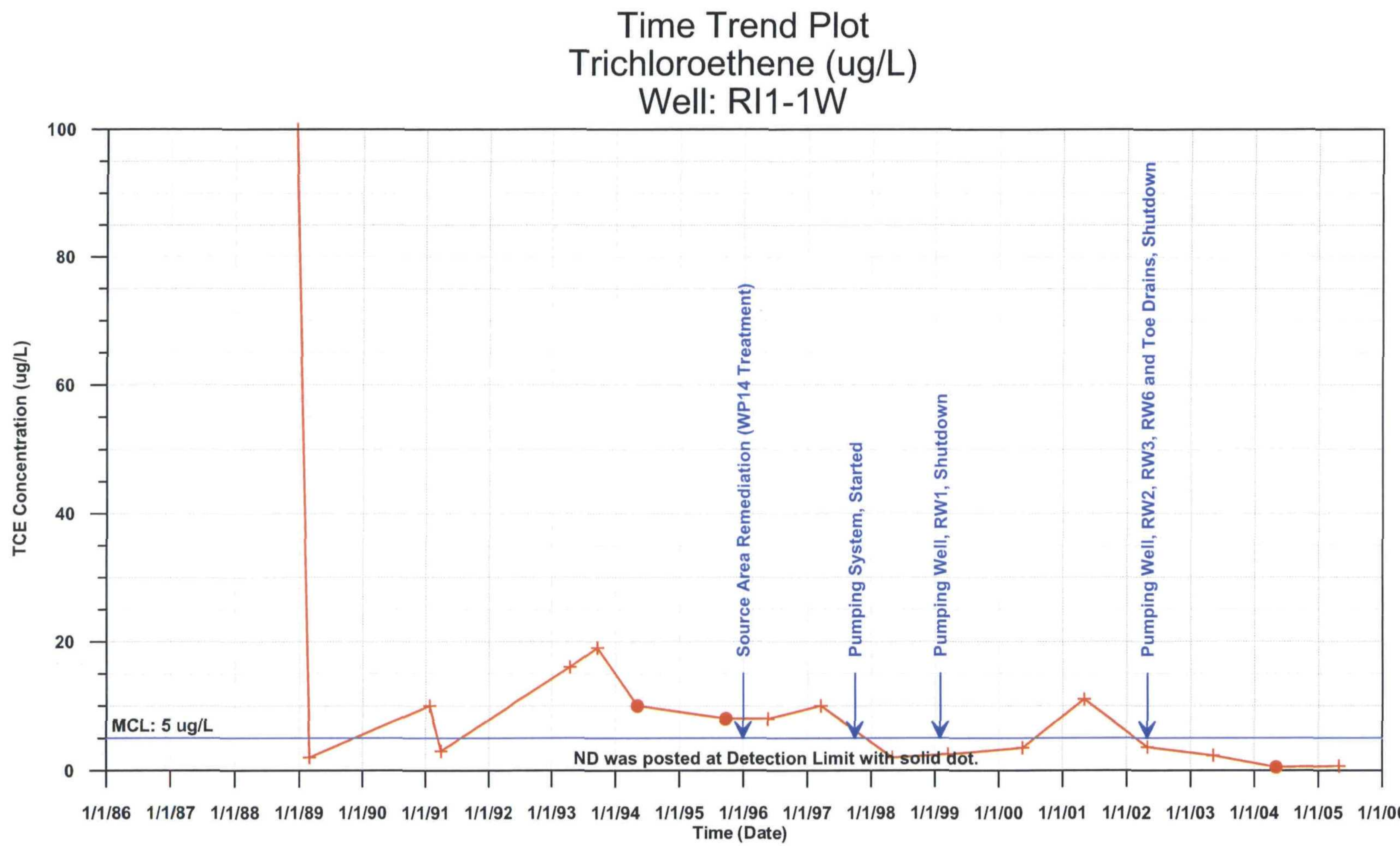
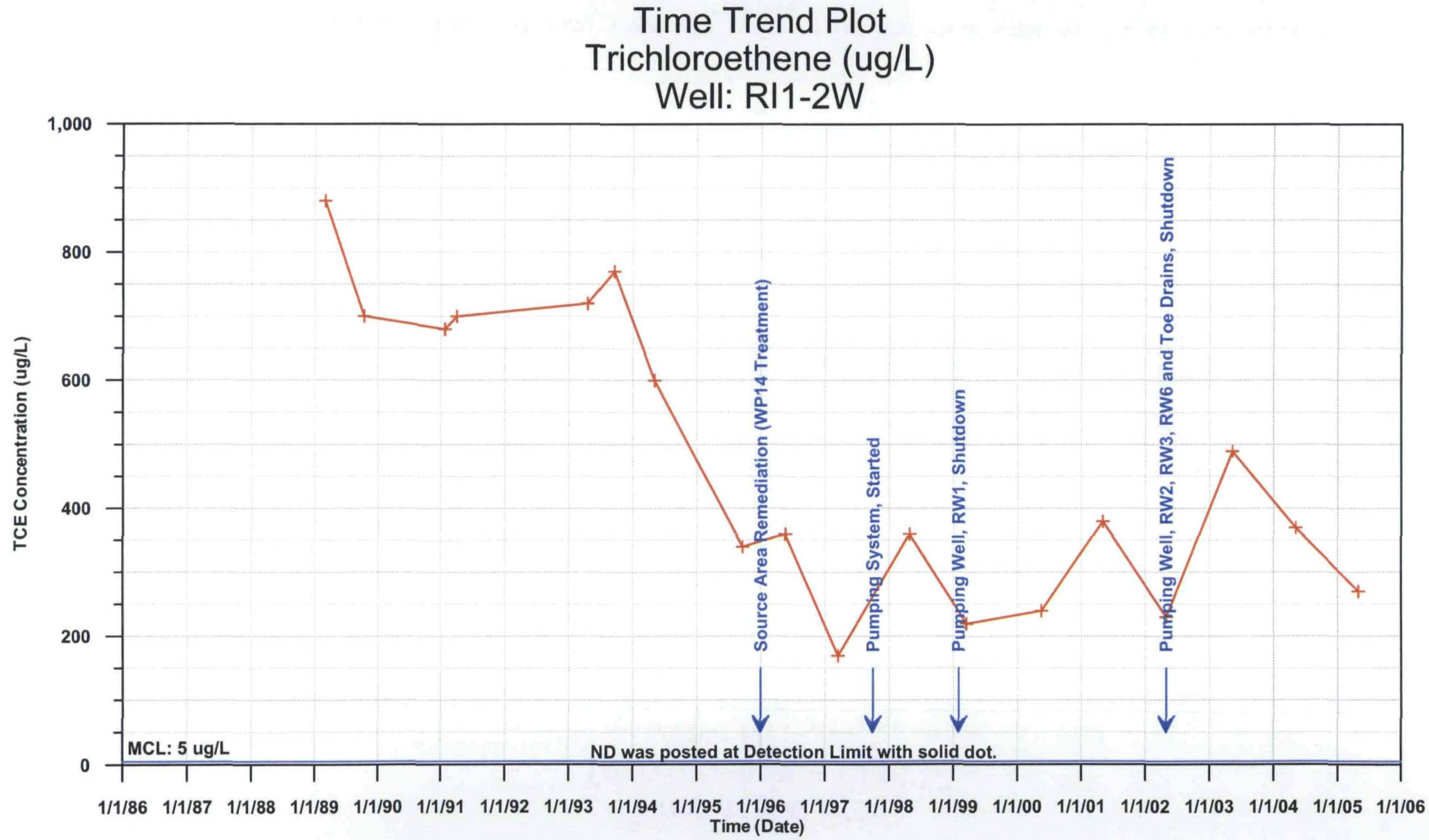
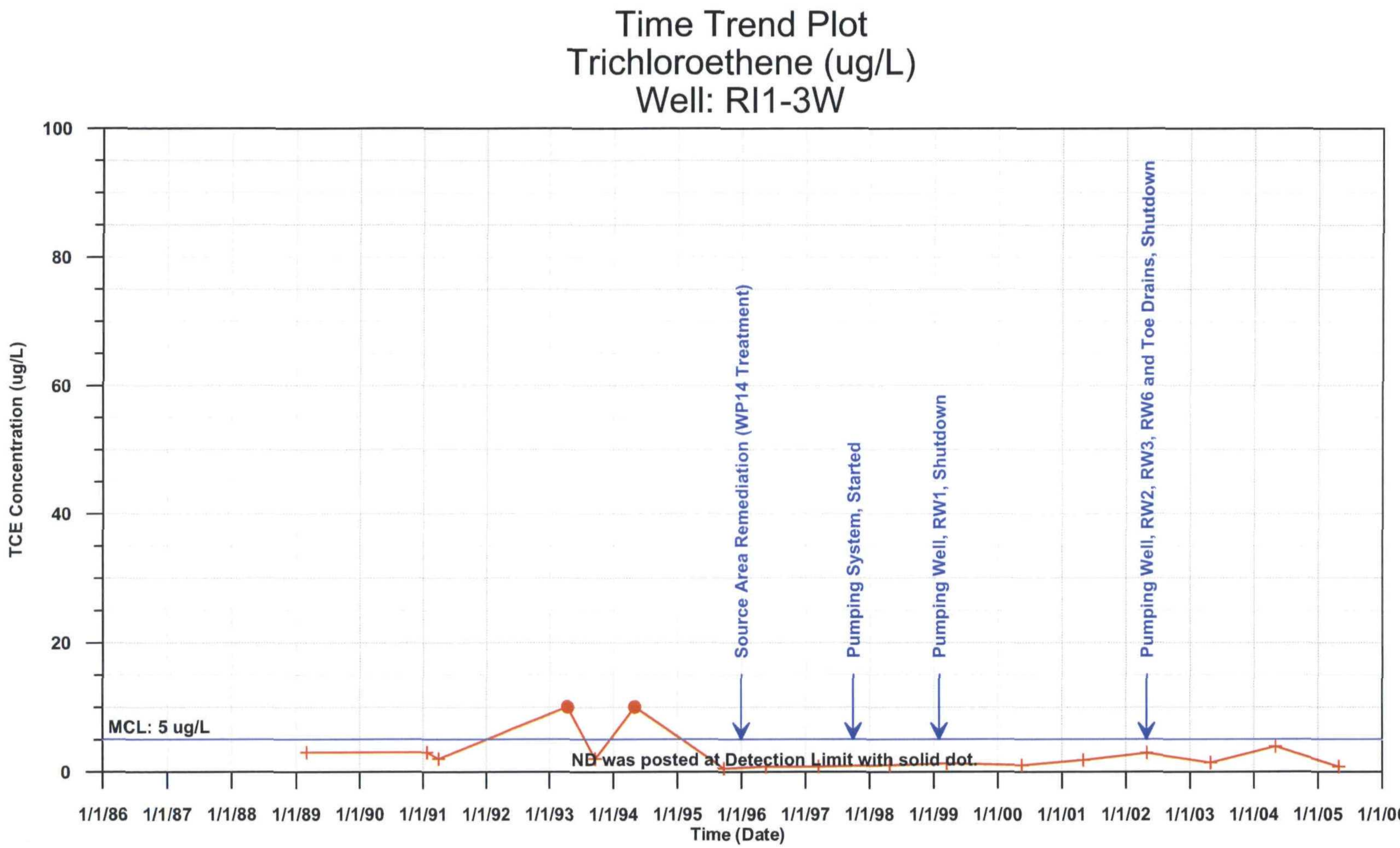
1/1/01
1/1/02
1/1/03
1/1/04
1/1/05
1/1/06
Time (Date)



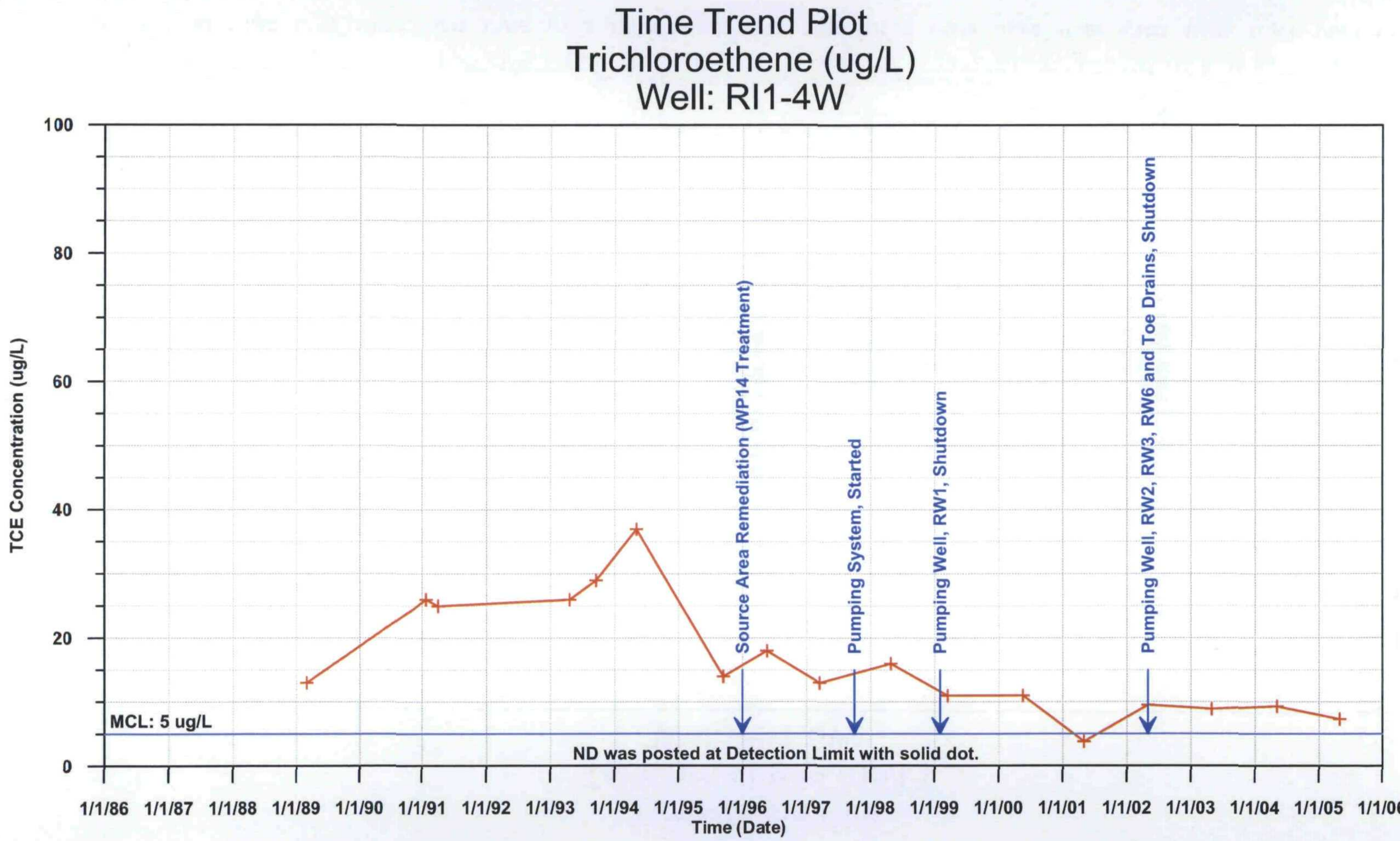
Time Trend Plot
Trichloroethene (ug/L)
Well: RI1-1W
TCE Concentration (ug/L)
100
80
60
40
20
0
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
1/1/86
1/1/87
1/1/88
1/1/89
1/1/90
1/1/91
1/1/92
1/1/93
1/1/94
1/1/95
1/1/96
1/1/97
1/1/98
1/1/99
1/1/00
1/1/01
1/1/02
1/1/03
1/1/04
1/1/05
1/1/06
Time (Date)



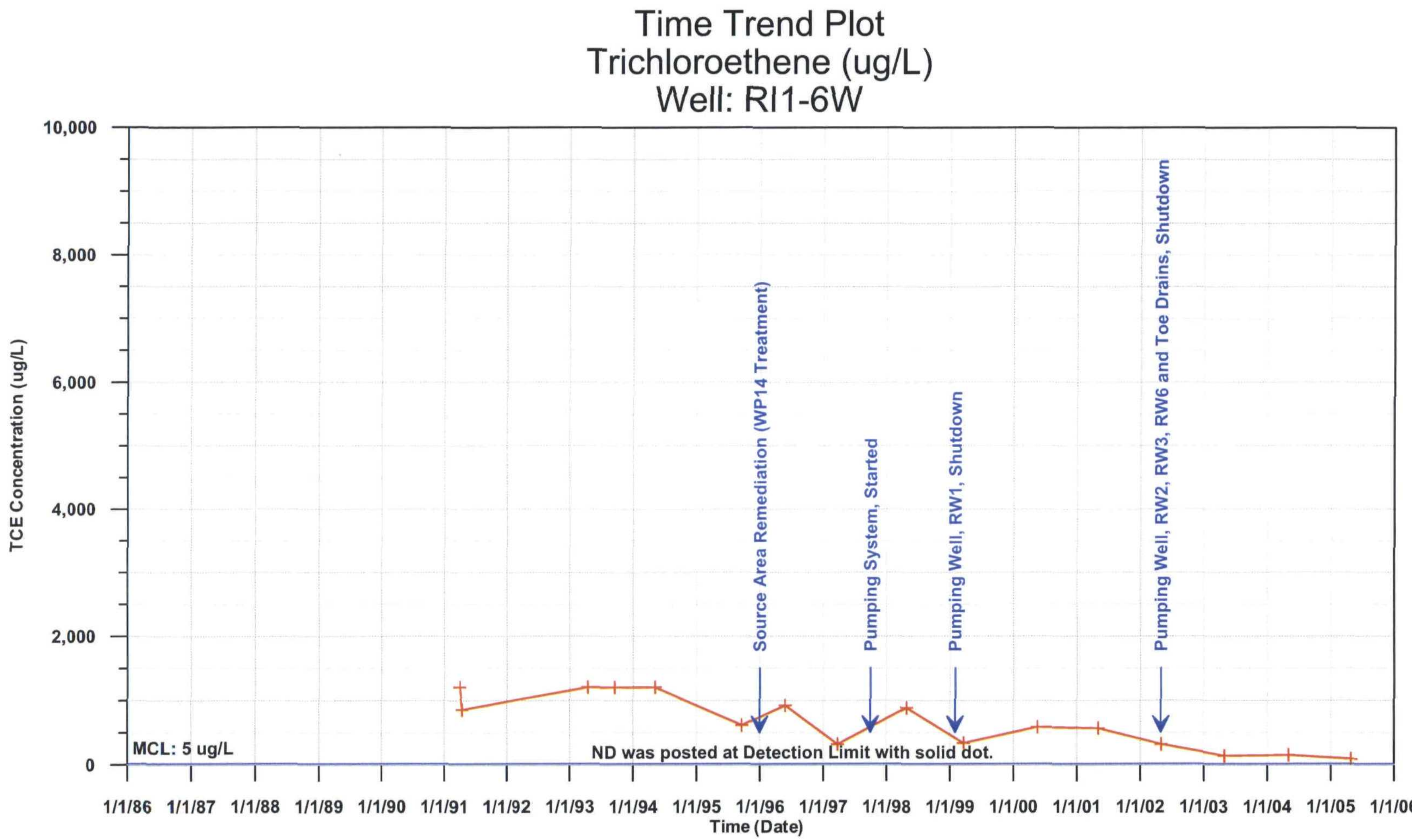
Time Trend Plot
Trichloroethene (ug/L)
Well: RI1-2W
1,000
800
600
400
200
0
TCE Concentration (ug/L)
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86
1/1/87
1/1/88
1/1/89
1/1/90
1/1/91
1/1/92
1/1/93
1/1/94
1/1/95
1/1/96
1/1/97
1/1/98
1/1/99
1/1/00
1/1/01
1/1/02
1/1/03
1/1/04
1/1/05
1/1/06
Time (Date)

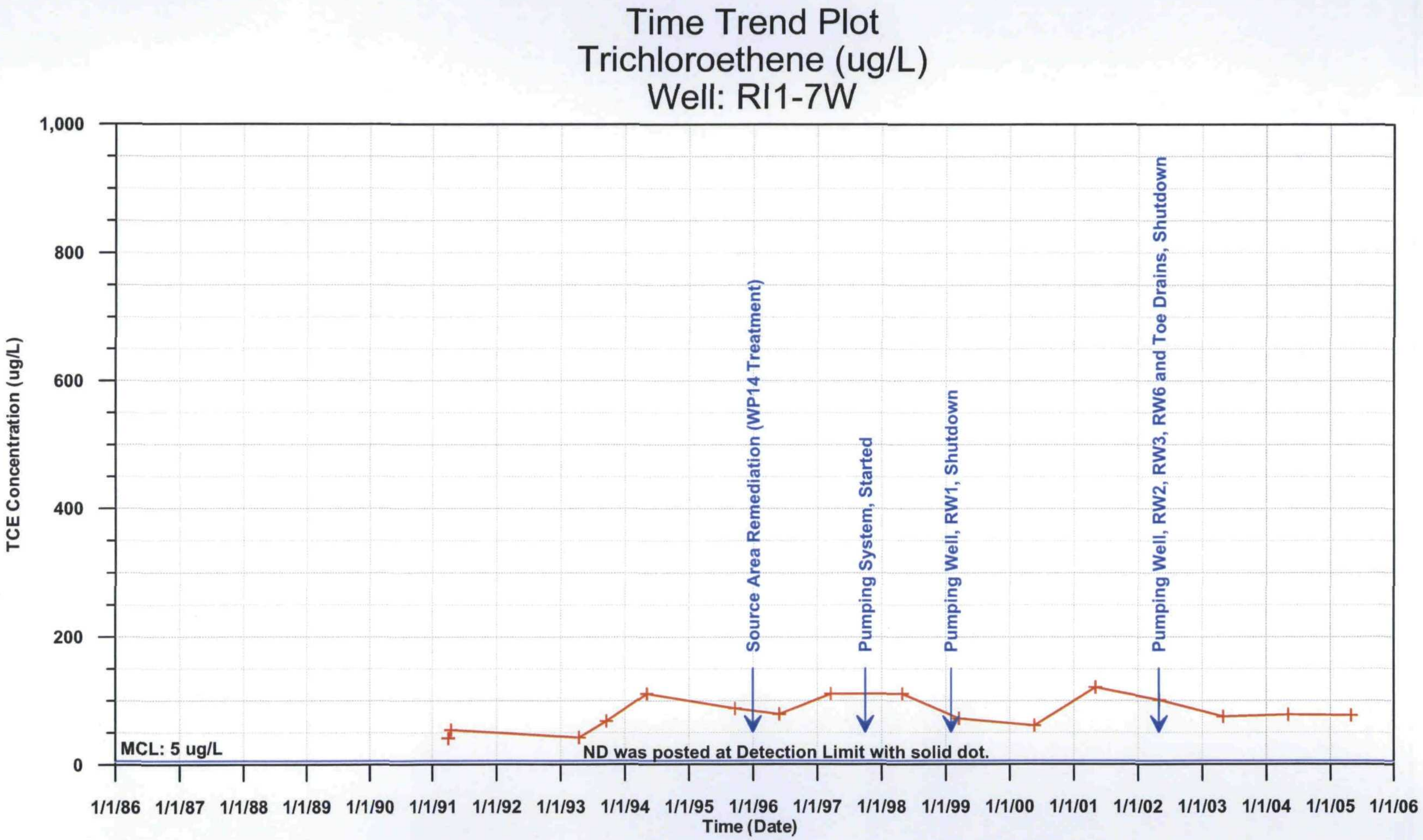


Time Trend Plot
Trichloroethene (ug/L)
Well: RI1-3W
TCE Concentration (ug/L)
100
80
60
40
20
0
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)



Time Trend Plot
Trichloroethene (ug/L)
Well: RI1-4W
100
80
60
40
20
0
TCE Concentration (ug/L)
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)


Time Trend Plot
Trichloroethene (ug/L)
Well: RI1-6W
10,000
8,000
6,000
4,000
2,000
0
TCE Concentration (ug/L)
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)



Time Trend Plot
Trichloroethene (ug/L)
Well: RI1-7W
TCE Concentration (ug/L)
1,000
800
600
400
200
0
Source Area Remediation (WP14 Treatment)
Pumping System, Started
Pumping Well, RW1, Shutdown
Pumping Well, RW2, RW3, RW6 and Toe Drains, Shutdown
MCL: 5 ug/L
ND was posted at Detection Limit with solid dot.
1/1/86 1/1/87 1/1/88 1/1/89 1/1/90 1/1/91 1/1/92 1/1/93 1/1/94 1/1/95 1/1/96 1/1/97 1/1/98 1/1/99 1/1/00 1/1/01 1/1/02 1/1/03 1/1/04 1/1/05 1/1/06
Time (Date)

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APPENDIX G

Historical Mass Removal Estimates for NPL Site Recovery Wells

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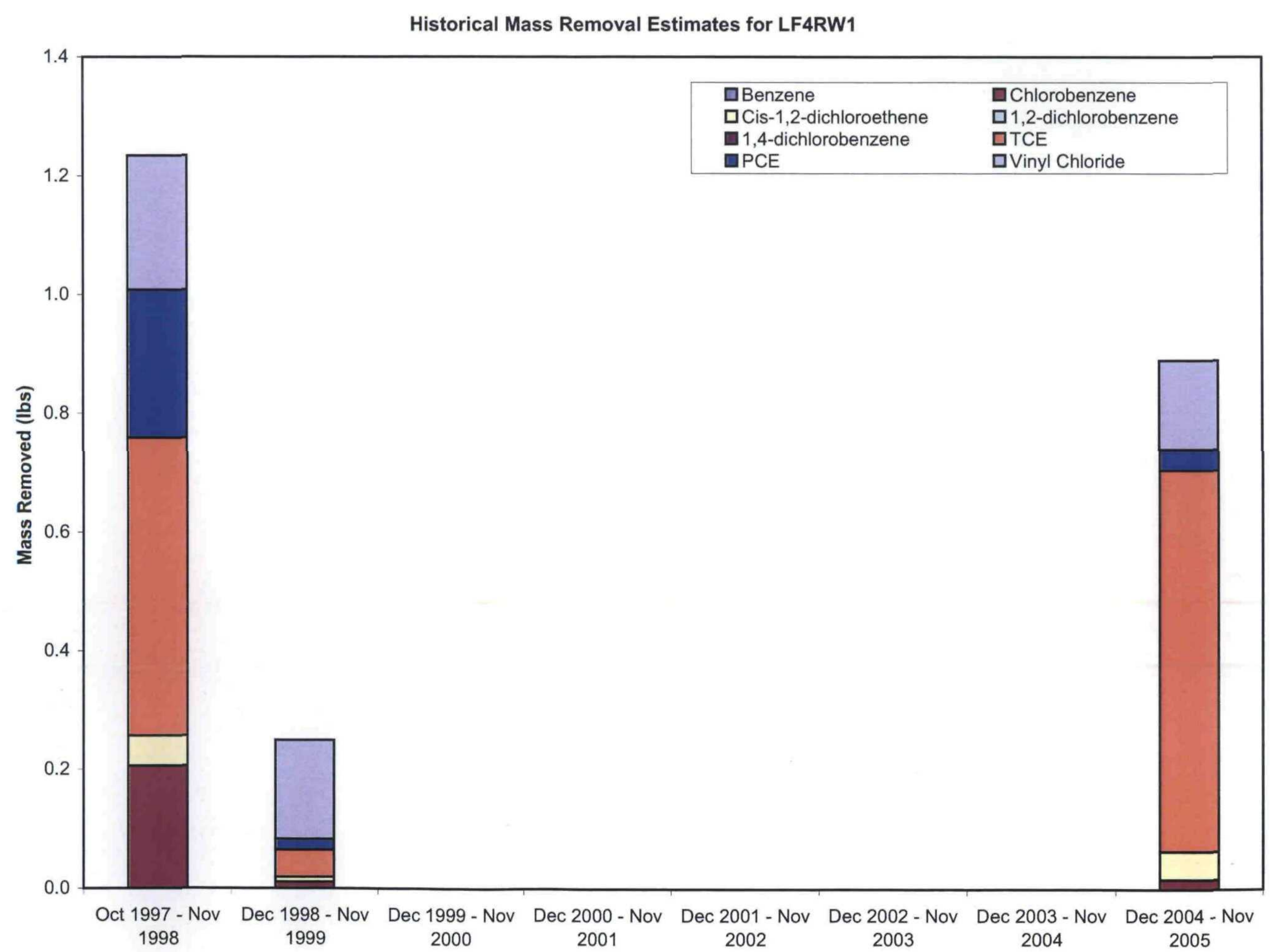
Table No. G-1
Historical Mass Removal Estimates for LF4RW1

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

		1,2-dichlorobenzene		1,4-dichlorobenzene		Benzene		Chlorobenzene		Cis-1,2-dichloroethene		PCE		TCE		Vinyl Chloride		Total Organics	
Reporting Period	Total Annual Flow * (gal)	Average Influent Concen. (µg/l)	Average Mass Removed (lbs)	Average Influent Concen. (µg/l)	Average Mass Removed (lbs)	Average Influent Concen. (µg/l)	Average Mass Removed (lbs)	Average Influent Concen. (µg/l)	Average Mass Removed (lbs)	Average Influent Concen. (µg/l)	Average Mass Removed (lbs)	Average Influent Concen. (µg/l)	Average Mass Removed (lbs)	Average Influent Concen. (µg/l)	Average Mass Removed (lbs)	Average Influent Concen. (µg/l)	Average Mass Removed (lbs)	Average Influent Concen. (µg/l)	Average Mass Removed (lbs)
Dec 2004 - Nov 2005	3,842,203	N/P	N/P	N/P	N/P	N/P	N/P	0.5	0.0	1.5	0.0	1.1	0.0	20.0	0.6	4.7	0.2	27.8	0.9
Dec 2003 - Nov 2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec 2002 - Nov 2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec 2001 - Nov 2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec 2000 - Nov 2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec 1999 - Nov 2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec 1998 - Nov 1999	1,671,814	N/P	N/P	N/P	N/P	N/P	N/P	0.8	0.0	0.6	0.0	1.3	0.0	3.3	0.0	12.0	0.2	17.9	0.2
Oct 1997 - Nov 1998	8,991,794	N/P	N/P	N/P	N/P	N/P	N/P	2.7	0.2	0.7	0.1	3.3	0.2	6.7	0.5	3.0	0.2	16.5	1.2
Total (lbs)			N/P		N/P		N/P		0.2		0.1		0.3		1.2		0.5		2.4

Notes:
1) The sum of the masses of the individual reporting periods may not be equal to the overall mass due to rounding.
* RW1 began operating in October 1997 and was shut down on 11 February 1999 with regulatory approval. However, RW1 was temporarily reactivated from 24 February 2005 to 1 June 2005.
-- Pump not operational in the given period of time.
N/P - Value not presented/not estimated; contaminant concentrations were generally at or below the reported detection limits.



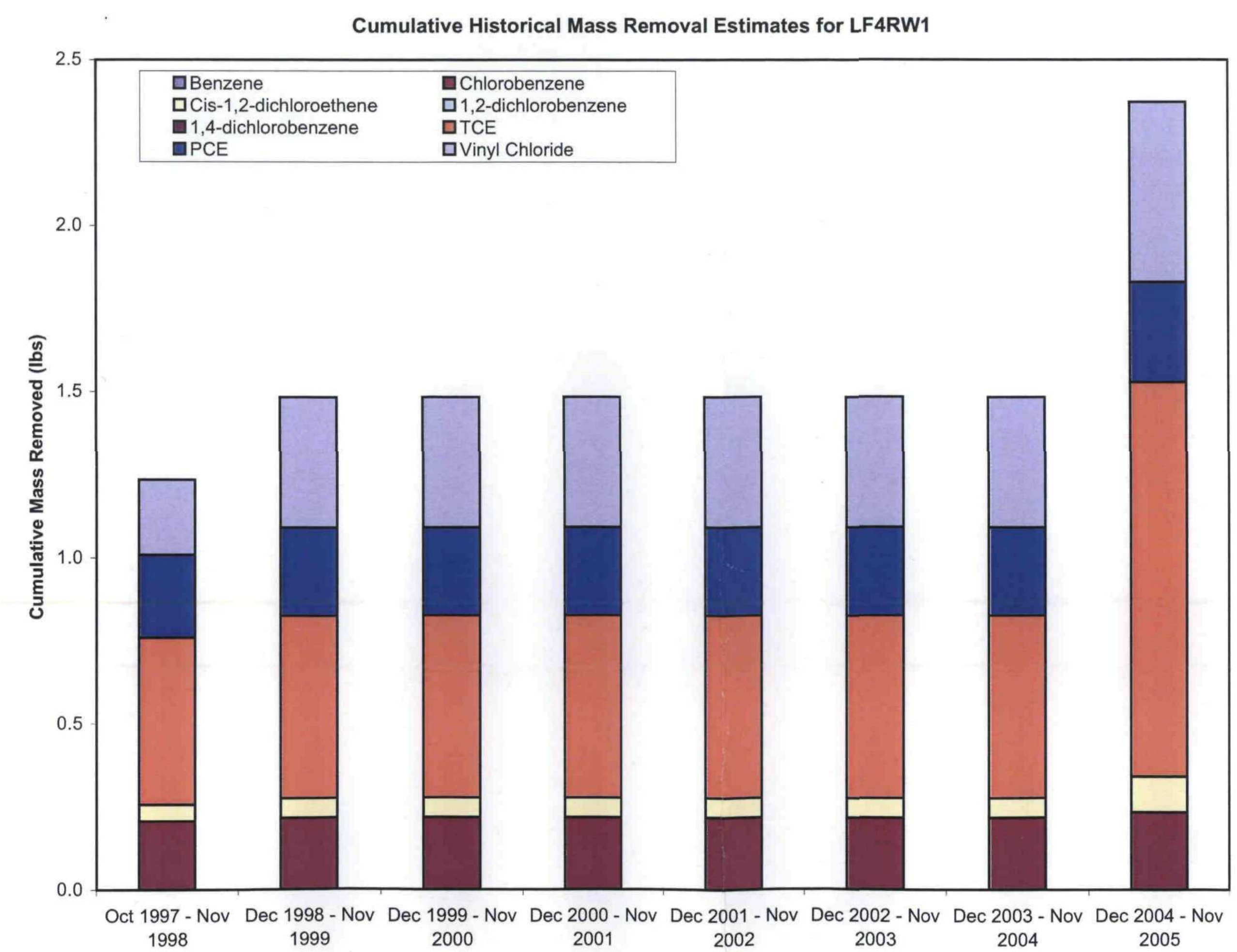


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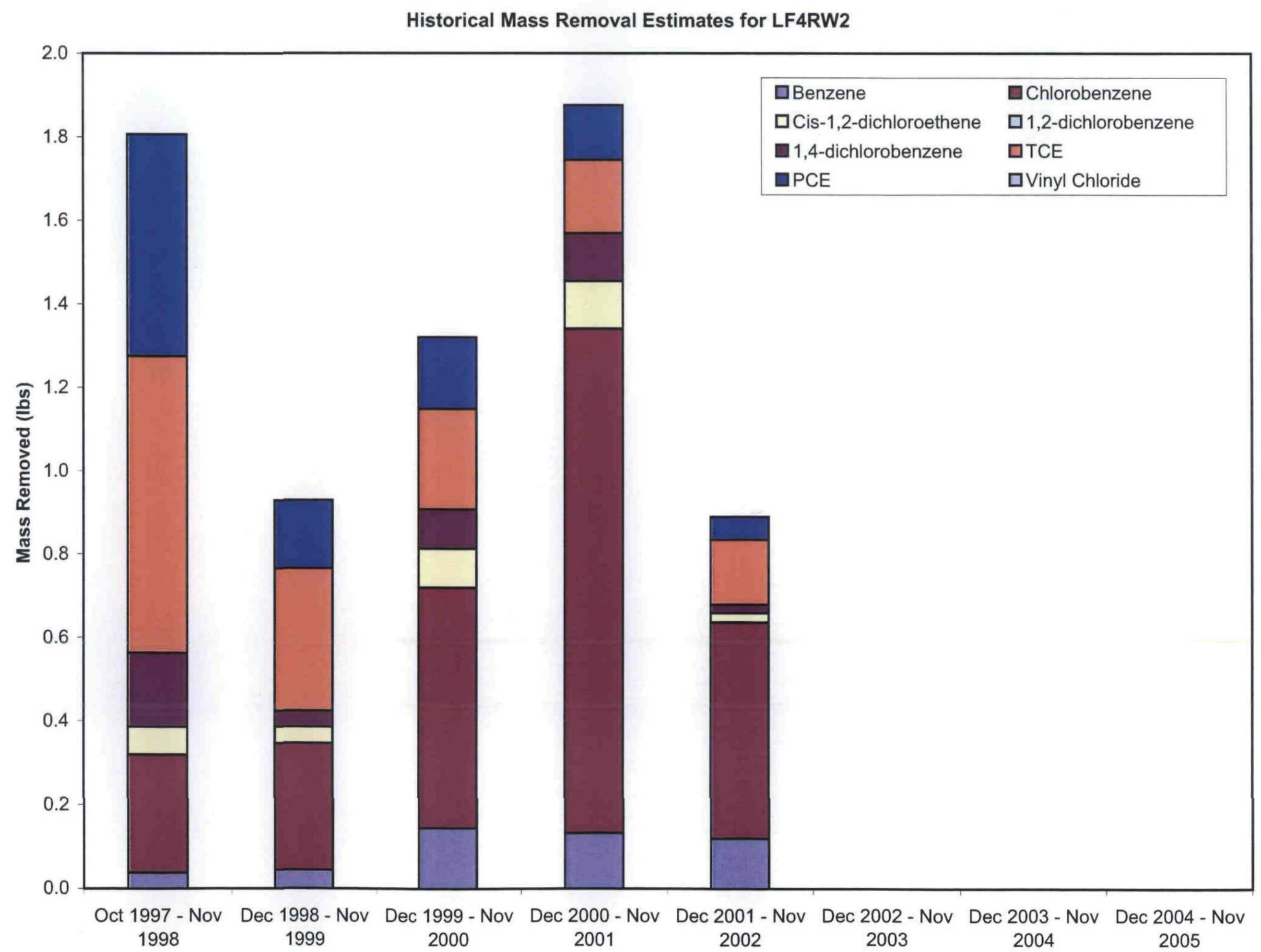
Table6-7 and 6-8 HistMassRemoval.xls

Table No. G-2
Historical Mass Removal Estimates for LF4RW2

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Reporting Period	Total Annual Flow (gal)	1,2-dichlorobenzene Average Influent Concen. (µg/l)	1,2-dichlorobenzene Average Mass Removed (lbs)	1,4-dichlorobenzene Average Influent Concen. (µg/l)	1,4-dichlorobenzene Average Mass Removed (lbs)	Benzene Average Influent Concen. (µg/l)	Benzene Average Mass Removed (lbs)	Chlorobenzene Average Influent Concen. (µg/l)	Chlorobenzene Average Mass Removed (lbs)	Cis-1,2-dichloroethene Average Influent Concen. (µg/l)	Cis-1,2-dichloroethene Average Mass Removed (lbs)	PCE Average Influent Concen. (µg/l)	PCE Average Mass Removed (lbs)	TCE Average Influent Concen. (µg/l)	TCE Average Mass Removed (lbs)	Vinyl Chloride Average Influent Concen. (µg/l)	Vinyl Chloride Average Mass Removed (lbs)	Total Organics Average Influent Concen. (µg/l)	Total Organics Average Mass Removed (lbs)
Dec 2004 - Nov 2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec 2003 - Nov 2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec 2002 - Nov 2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec 2001 - Nov 2002	4,432,142	N/P	N/P	0.5	0.0	3.3	0.1	14.0	0.5	0.6	0.0	1.5	0.1	4.2	0.2	N/P	N/P	24.1	0.9
Dec 2000 - Nov 2001	9,175,057	N/P	N/P	1.5	0.1	1.7	0.1	15.8	1.2	1.5	0.1	1.7	0.1	2.3	0.2	N/P	N/P	24.6	1.9
Dec 1999 - Nov 2000	9,640,637	N/P	N/P	1.2	0.1	1.8	0.1	7.2	0.6	1.2	0.1	2.1	0.2	3.0	0.2	N/P	N/P	16.4	1.3
Dec 1998 - Nov 1999	9,332,193	N/P	N/P	0.5	0.0	0.6	0.0	3.9	0.3	0.5	0.0	2.1	0.2	4.4	0.3	N/P	N/P	12.0	0.9
Oct 1997 - Nov 1998	9,109,819	N/P	N/P	2.3	0.2	0.5	0.0	3.7	0.3	0.9	0.1	7.0	0.5	9.4	0.7	N/P	N/P	23.8	1.8
Total (lbs)			**N/P**		**0.4**		**0.5**		**2.9**		**0.3**		**1.1**		**1.6**		**N/P**		**6.8**

Notes:
1) The sum of the masses of the individual reporting periods may not be equal to the overall mass due to rounding.
-- Pump not operational in the given period of time.
N/P - Value not presented/not estimated; contaminant concentrations were generally at or below the reported detection limits.



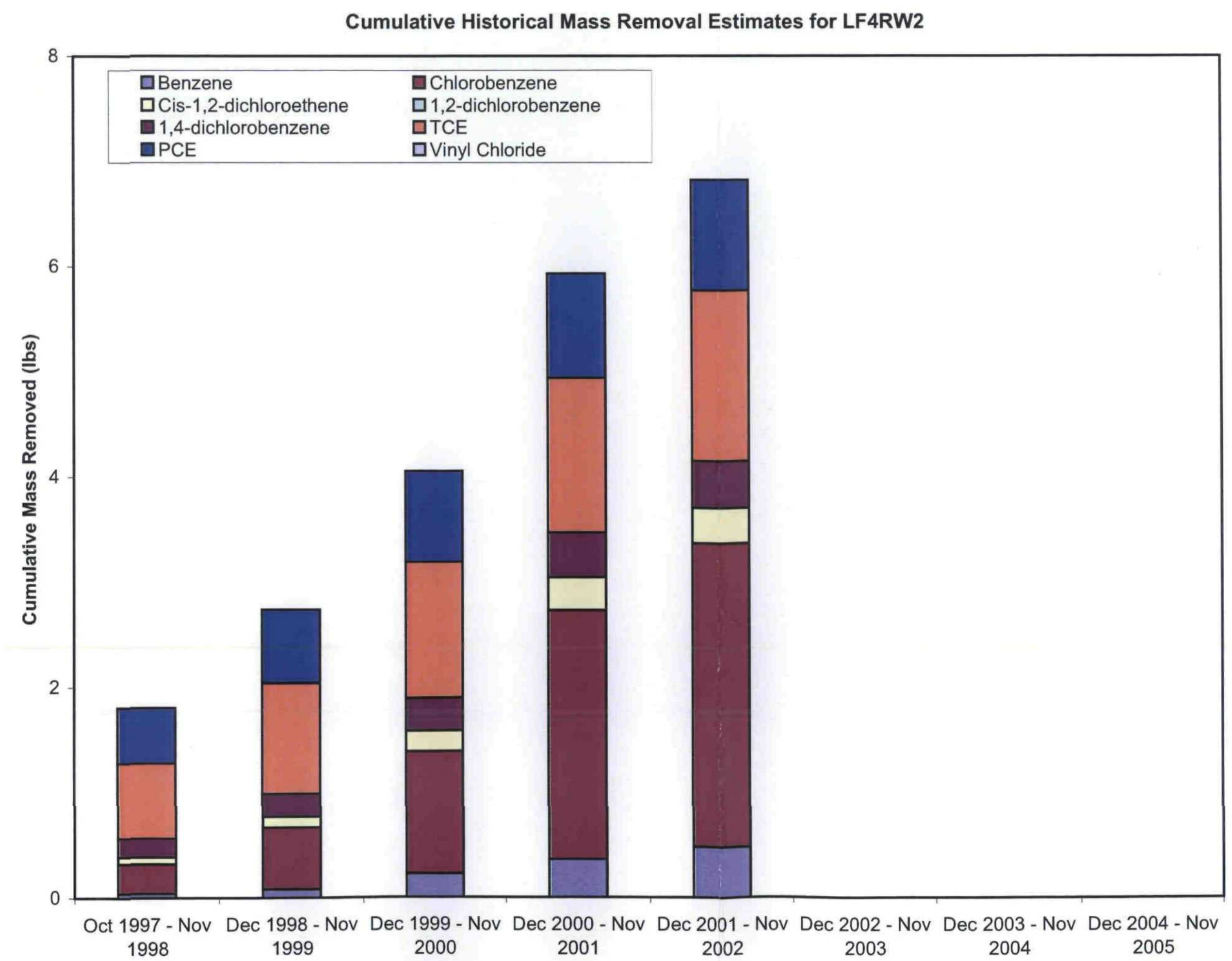


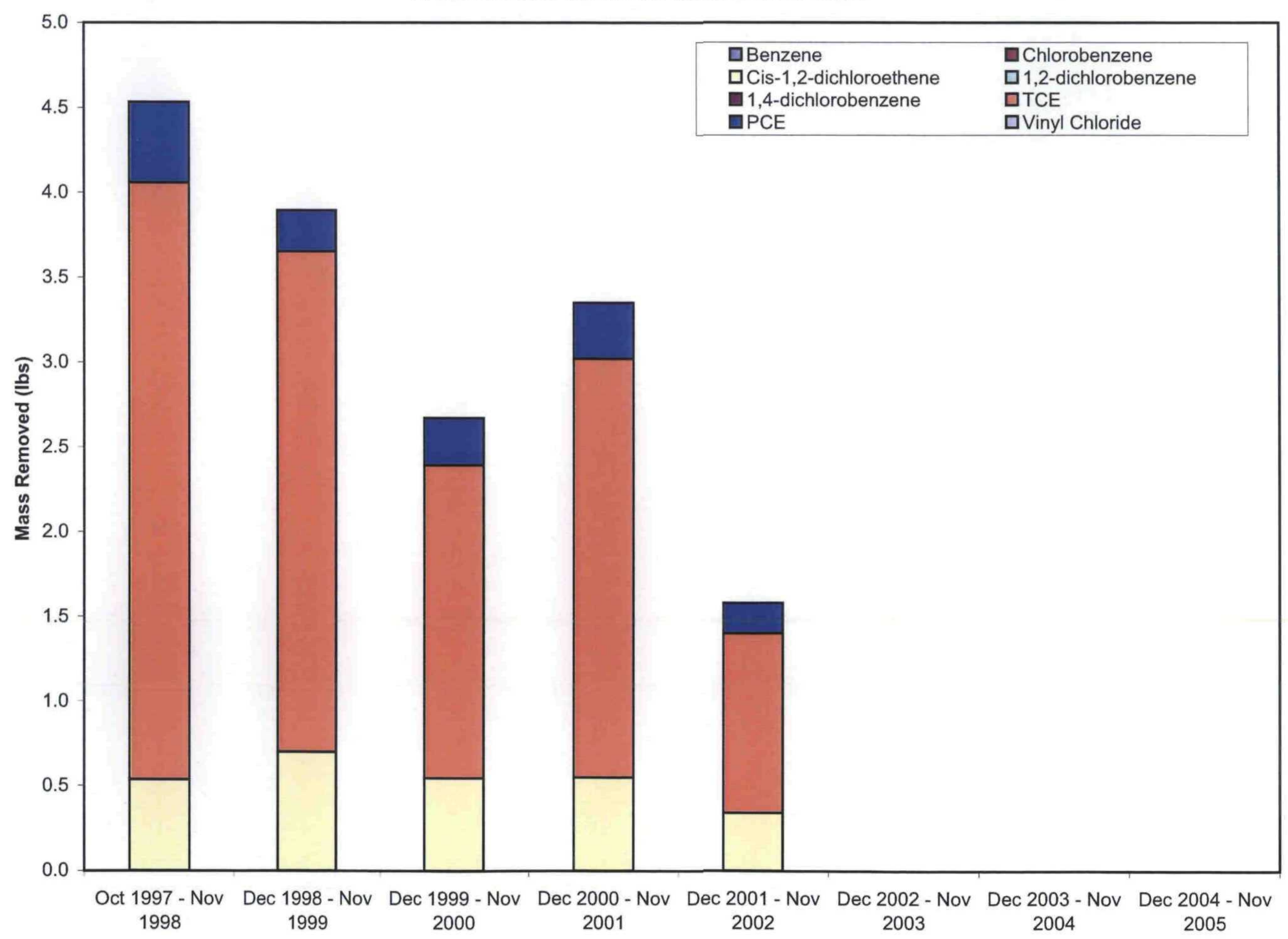
Table No. G-3
Historical Mass Removal Estimates for LF4RW3

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Reporting Period	Total Annual Flow (gal)	1,2-dichlorobenzene Average Influent Concen. (µg/l)	1,2-dichlorobenzene Average Mass Removed (lbs)	1,4-dichlorobenzene Average Influent Concen. (µg/l)	1,4-dichlorobenzene Average Mass Removed (lbs)	Benzene Average Influent Concen. (µg/l)	Benzene Average Mass Removed (lbs)	Chlorobenzene Average Influent Concen. (µg/l)	Chlorobenzene Average Mass Removed (lbs)	Cis-1,2-dichloroethene Average Influent Concen. (µg/l)	Cis-1,2-dichloroethene Average Mass Removed (lbs)	PCE Average Influent Concen. (µg/l)	PCE Average Mass Removed (lbs)	TCE Average Influent Concen. (µg/l)	TCE Average Mass Removed (lbs)	Vinyl Chloride Average Influent Concen. (µg/l)	Vinyl Chloride Average Mass Removed (lbs)	Total Organics Average Influent Concen. (µg/l)	Total Organics Average Mass Removed (lbs)
Dec 2004 - Nov 2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec 2003 - Nov 2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec 2002 - Nov 2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec 2001 - Nov 2002	5,781,913	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	7.1	0.3	3.8	0.2	22.0	1.1	N/P	N/P	32.9	1.6
Dec 2000 - Nov 2001	13,239,577	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	5.0	0.6	3.0	0.3	22.4	2.5	N/P	N/P	30.4	3.4
Dec 1999 - Nov 2000	13,402,874	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	4.9	0.5	2.5	0.3	16.5	1.8	N/P	N/P	23.9	2.7
Dec 1998 - Nov 1999	15,415,229	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	5.5	0.7	1.9	0.2	23.0	3.0	N/P	N/P	30.4	3.9
Oct 1997 - Nov 1998	16,918,510	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	3.8	0.5	3.4	0.5	25.0	3.5	N/P	N/P	32.2	4.5
Total (lbs)			**N/P**		**N/P**		**N/P**		**N/P**		**2.7**		**1.5**		**11.8**		**N/P**		**16.0**

Notes:
1) The sum of the masses of the individual reporting periods may not be equal to the overall mass due to rounding.
-- Pump not operational in the given period of time.
N/P - Value not presented/not estimated; contaminant concentrations were generally at or below the reported detection limits.

Historical Mass Removal Estimates for LF4RW3



Cumulative Historical Mass Removal Estimates for LF4RW3

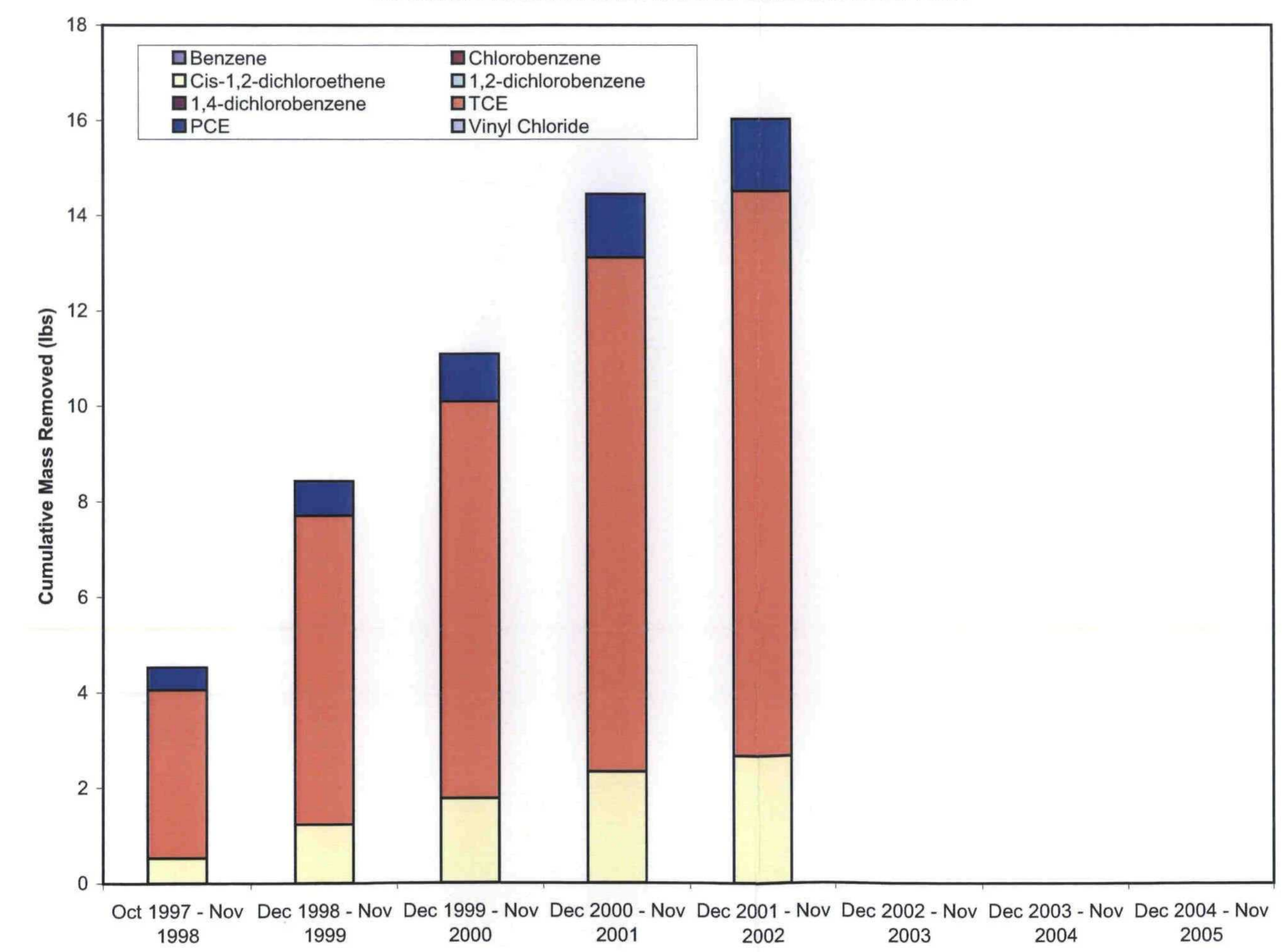
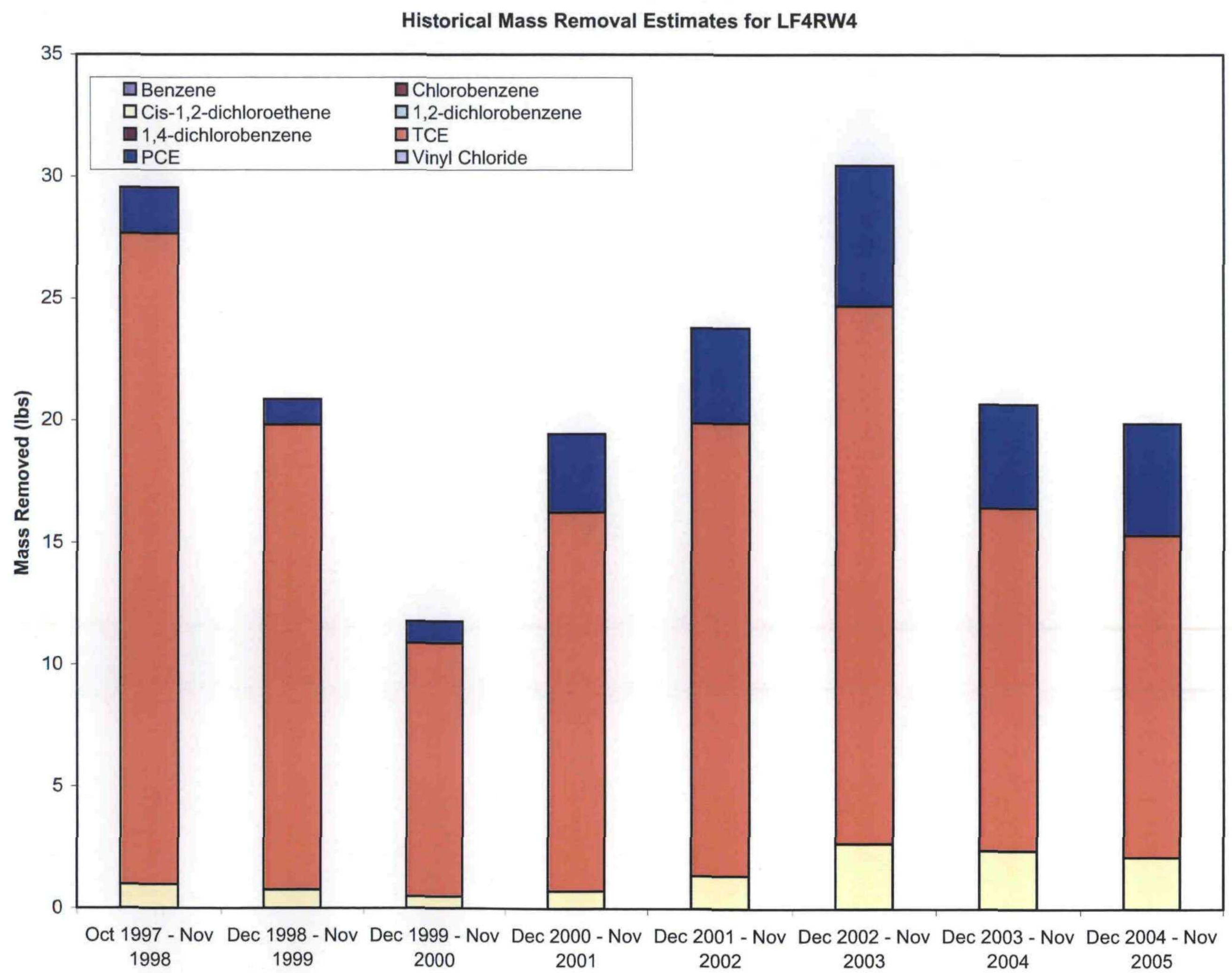


Table No. G-4
Historical Mass Removal Estimates for LF4RW4

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

		1,2-dichlorobenzene		1,4-dichlorobenzene		Benzene		Chlorobenzene		Cis-1,2-dichloroethene		PCE		TCE		Vinyl Chloride		Total Organics	
Reporting Period	Total Annual Flow (gal)	Average Influent Concen. (µg/l)	Average Mass Removed (lbs)	Average Influent Concen. (µg/l)	Average Mass Removed (lbs)	Average Influent Concen. (µg/l)	Average Mass Removed (lbs)	Average Influent Concen. (µg/l)	Average Mass Removed (lbs)	Average Influent Concen. (µg/l)	Average Mass Removed (lbs)	Average Influent Concen. (µg/l)	Average Mass Removed (lbs)	Average Influent Concen. (µg/l)	Average Mass Removed (lbs)	Average Influent Concen. (µg/l)	Average Mass Removed (lbs)	Average Influent Concen. (µg/l)	Average Mass Removed (lbs)
Dec 2004 - Nov 2005	24,173,115	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	10.6	2.1	22.8	4.6	65.5	13.2	N/P	N/P	98.8	19.9
Dec 2003 - Nov 2004	27,433,472	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	10.5	2.4	18.7	4.3	61.3	14.0	N/P	N/P	90.5	20.7
Dec 2002 - Nov 2003	27,822,552	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	11.6	2.7	24.9	5.8	95.0	22.0	N/P	N/P	131.5	30.5
Dec 2001 - Nov 2002	15,900,186	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	10.2	1.4	29.5	3.9	140.0	18.5	N/P	N/P	179.7	23.8
Dec 2000 - Nov 2001	14,119,760	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	6.1	0.7	27.3	3.2	132.0	15.5	N/P	N/P	165.4	19.4
Dec 1999 - Nov 2000	13,686,912	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	4.2	0.5	7.8	0.9	91.2	10.4	N/P	N/P	103.3	11.8
Dec 1998 - Nov 1999	18,330,058	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	5.0	0.8	6.8	1.0	125.0	19.1	N/P	N/P	136.8	20.9
Oct 1997 - Nov 1998	16,874,663	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	7.0	1.0	13.4	1.9	190.0	26.7	N/P	N/P	210.4	29.6
Total (lbs)			**N/P**		**N/P**		**N/P**		**N/P**		**11.5**		**25.6**		**139.4**		**N/P**		**176.5**

Notes:
1) The sum of the masses of the individual reporting periods may not be equal to the overall mass due to rounding.
N/P - Value not presented/not estimated; contaminant concentrations were generally at or below the reported detection limits.



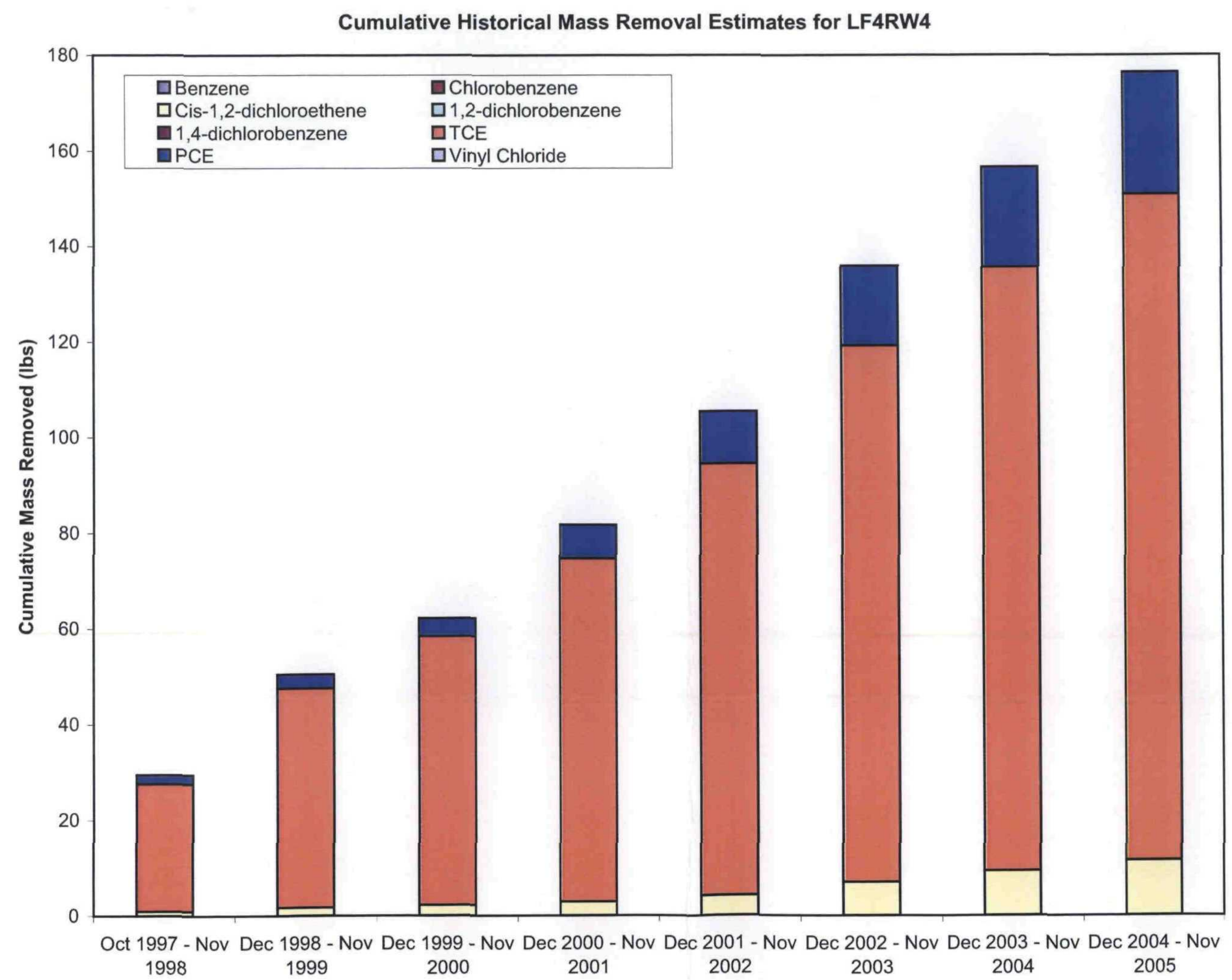
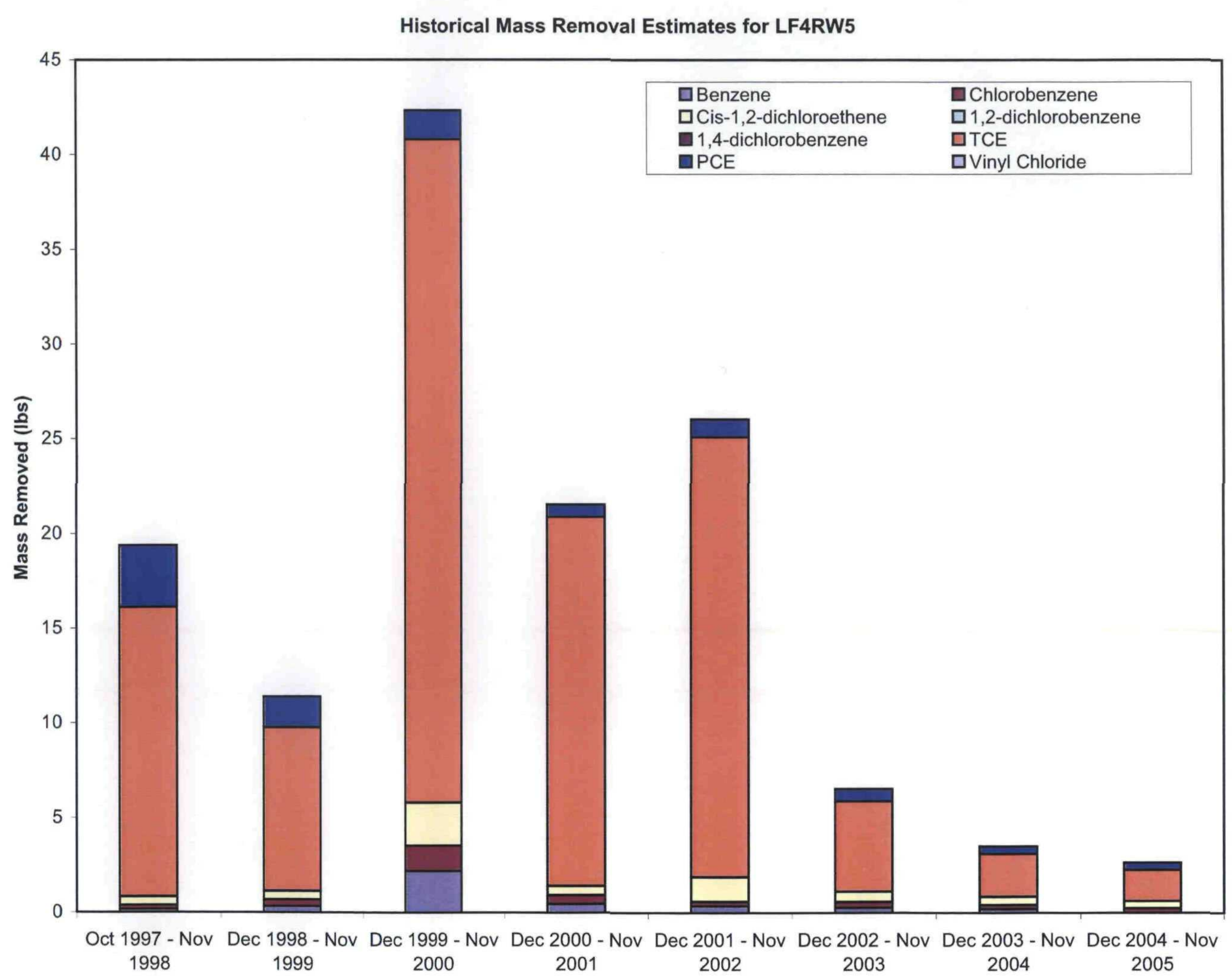


Table No. G-5
Historical Mass Removal Estimates for LF4RW5

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Reporting Period	Total Annual Flow (gal)	1,2-dichlorobenzene Average Influent Concen. (µg/l)	1,2-dichlorobenzene Average Mass Removed (lbs)	1,4-dichlorobenzene Average Influent Concen. (µg/l)	1,4-dichlorobenzene Average Mass Removed (lbs)	Benzene Average Influent Concen. (µg/l)	Benzene Average Mass Removed (lbs)	Chlorobenzene Average Influent Concen. (µg/l)	Chlorobenzene Average Mass Removed (lbs)	Cis-1,2-dichloroethene Average Influent Concen. (µg/l)	Cis-1,2-dichloroethene Average Mass Removed (lbs)	PCE Average Influent Concen. (µg/l)	PCE Average Mass Removed (lbs)	TCE Average Influent Concen. (µg/l)	TCE Average Mass Removed (lbs)	Vinyl Chloride Average Influent Concen. (µg/l)	Vinyl Chloride Average Mass Removed (lbs)	Total Organics Average Influent Concen. (µg/l)	Total Organics Average Mass Removed (lbs)
Dec 2004 - Nov 2005	20,592,768	N/P	N/P	N/P	N/P	N/P	N/P	1.4	0.2	2.2	0.4	2.2	0.4	9.7	1.7	N/P	N/P	15.5	2.7
Dec 2003 - Nov 2004	18,670,862	N/P	N/P	N/P	N/P	1.3	0.2	1.4	0.2	2.8	0.4	2.5	0.4	14.6	2.3	N/P	N/P	22.6	3.5
Dec 2002 - Nov 2003	24,418,905	N/P	N/P	N/P	N/P	1.4	0.3	1.5	0.3	2.7	0.5	3.2	0.7	23.5	4.8	N/P	N/P	32.1	6.5
Dec 2001 - Nov 2002	18,555,348	N/P	N/P	N/P	N/P	2.3	0.3	1.6	0.2	8.4	1.3	6.3	1.0	150.0	23.2	N/P	N/P	168.5	26.0
Dec 2000 - Nov 2001	11,132,467	N/P	N/P	N/P	N/P	5.0	0.5	5.0	0.5	5.3	0.5	7.2	0.7	209.5	19.4	N/P	N/P	232.0	21.5
Dec 1999 - Nov 2000	12,087,731	N/P	N/P	N/P	N/P	21.7	2.2	13.3	1.3	22.5	2.3	15.4	1.5	347.7	35.0	N/P	N/P	420.5	42.3
Dec 1998 - Nov 1999	13,881,084	N/P	N/P	N/P	N/P	2.8	0.3	3.0	0.3	4.0	0.5	14.0	1.6	74.5	8.6	N/P	N/P	98.3	11.4
Oct 1997 - Nov 1998	12,225,317	N/P	N/P	N/P	N/P	1.6	0.2	2.0	0.2	4.5	0.5	32.3	3.3	150.0	15.3	N/P	N/P	190.4	19.4
Total (lbs)			**N/P**		**N/P**		**4.0**		**3.3**		**6.3**		**9.5**		**110.2**		**N/P**		**133.3**

Notes:
1) The sum of the masses of the individual reporting periods may not be equal to the overall mass due to rounding.
N/P - Value not presented/not estimated; contaminant concentrations were generally at or below the reported detection limits.



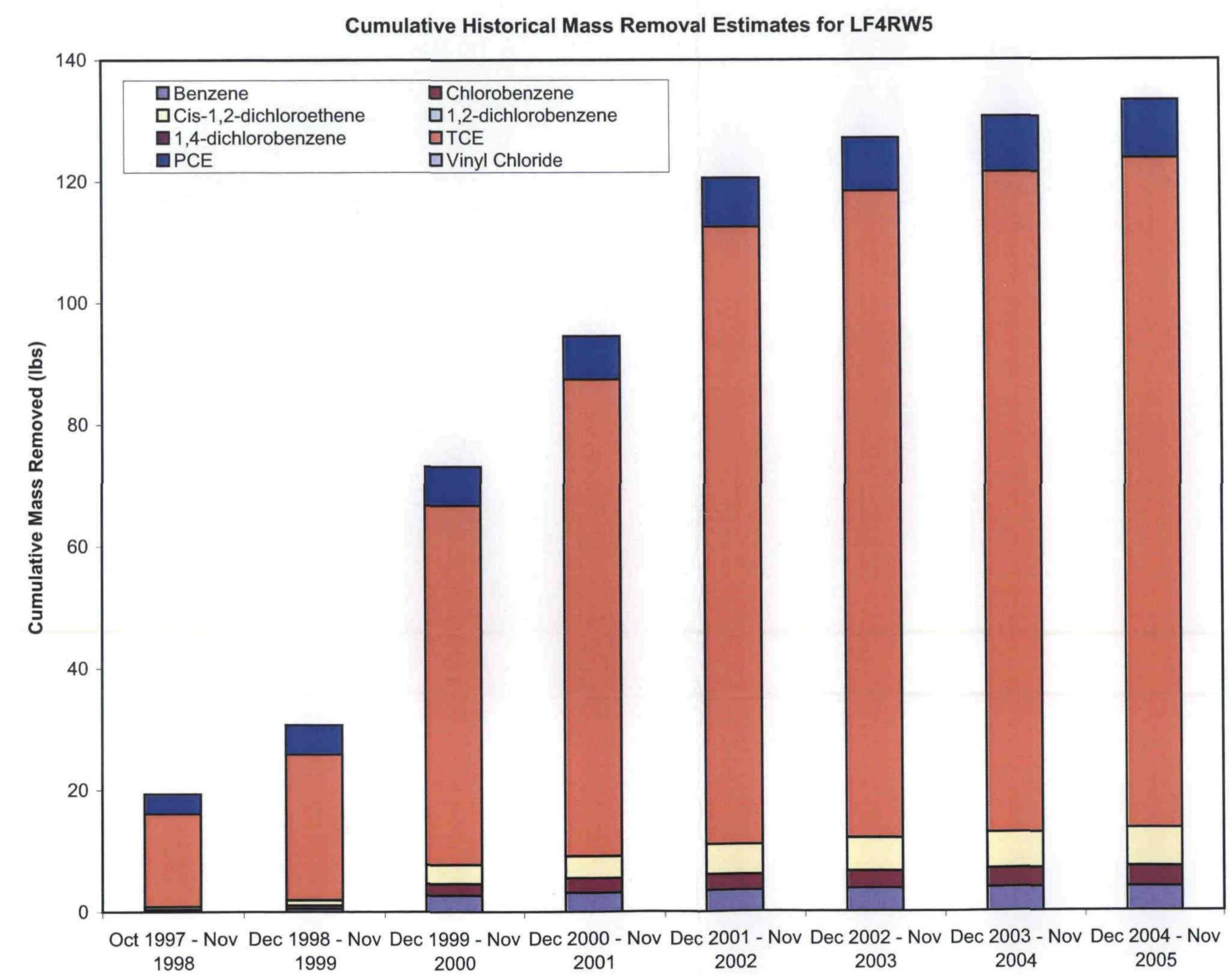


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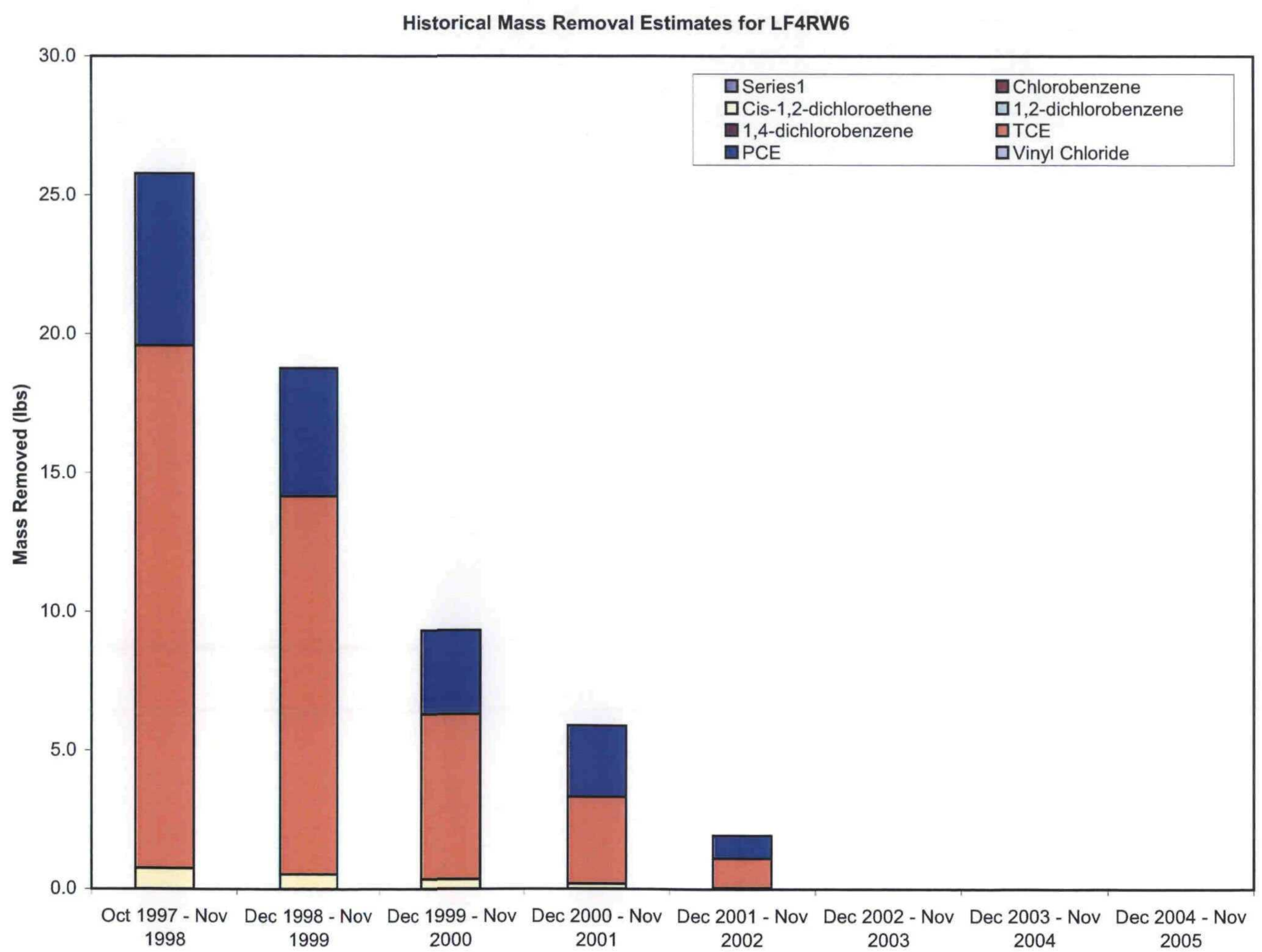
Table6-7 and 6-8 HistMassRemoval.xls

Table No. G-6
Historical Mass Removal Estimates for LF4RW6

Second Five-Year Review Report for the NPL Site, OU1 and OU3
Robins Air Force Base, Georgia

Reporting Period	Total Annual Flow (gal)	1,2-dichlorobenzene Average Influent Concen. (µg/l)	1,2-dichlorobenzene Average Mass Removed (lbs)	1,4-dichlorobenzene Average Influent Concen. (µg/l)	1,4-dichlorobenzene Average Mass Removed (lbs)	Benzene Average Influent Concen. (µg/l)	Benzene Average Mass Removed (lbs)	Chlorobenzene Average Influent Concen. (µg/l)	Chlorobenzene Average Mass Removed (lbs)	Cis-1,2-dichloroethene Average Influent Concen. (µg/l)	Cis-1,2-dichloroethene Average Mass Removed (lbs)	PCE Average Influent Concen. (µg/l)	PCE Average Mass Removed (lbs)	TCE Average Influent Concen. (µg/l)	TCE Average Mass Removed (lbs)	Vinyl Chloride Average Influent Concen. (µg/l)	Vinyl Chloride Average Mass Removed (lbs)	Total Organics Average Influent Concen. (µg/l)	Total Organics Average Mass Removed (lbs)
Dec 2004 - Nov 2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec 2003 - Nov 2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec 2002 - Nov 2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec 2001 - Nov 2002	5,733,209	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	1.0	0.0	17.5	0.8	22.0	1.1	N/P	N/P	40.5	1.9
Dec 2000 - Nov 2001	12,960,375	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	1.8	0.2	23.7	2.6	29.0	3.1	N/P	N/P	54.4	5.9
Dec 1999 - Nov 2000	12,447,138	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	3.4	0.4	28.9	3.0	57.3	5.9	N/P	N/P	89.6	9.3
Dec 1998 - Nov 1999	14,213,970	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	4.5	0.5	39.0	4.6	115.0	13.6	N/P	N/P	158.5	18.8
Oct 1997 - Nov 1998	12,561,854	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	7.2	0.8	59.3	6.2	180.0	18.8	N/P	N/P	246.5	25.8
Total (lbs)			N/P		N/P		N/P		N/P		1.9		17.2		42.5		N/P		61.6

Notes:
1) The sum of the masses of the individual reporting periods may not be equal to the overall mass due to rounding.
-- Pump not operational in the given period of time.
N/P - Value not presented/not estimated; contaminant concentrations were generally at or below the reported detection limits.



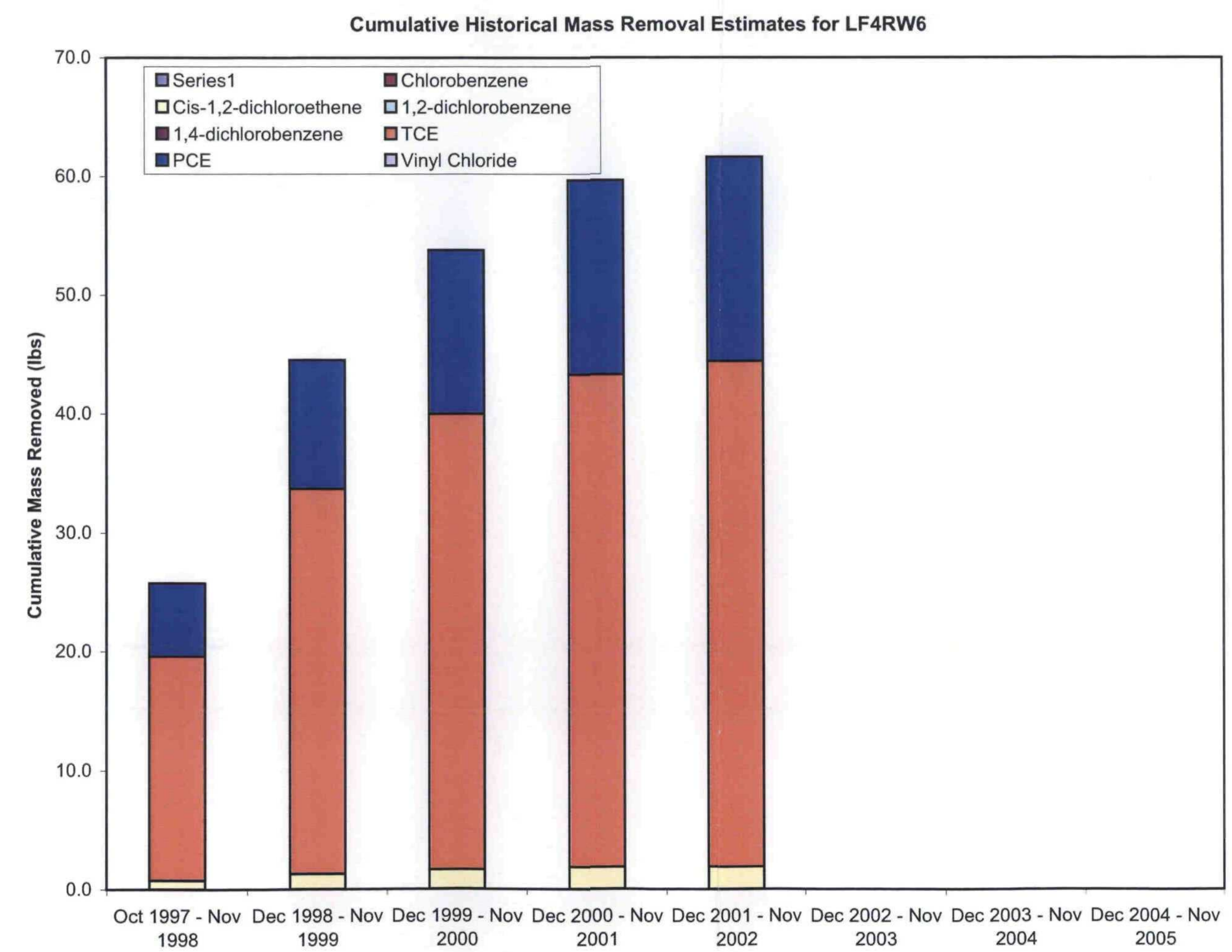


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Table6-7 and 6-8 HistMassRemoval.xls

APPENDIX H

Site Inspection Letter

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, S.W.
ATLANTA, GEORGIA 30303

May 15, 2006

4WD-FFB

Mr. Steven W. Coyle, Director
Environmental Management
WR-ALC/EM
455 Byron Street, Suite 465
Robins AFB, Georgia 31098-1860

SUBJ: Five-Year Review Inspection Report for the NPL Site, OUs 1 and 3
Robins Air Force Base, Georgia GA1 570 024 330

Dear Mr. Coyle:

The U.S. Environmental Protection Agency, Region 4, conducted a Five-Year Review Inspection at Robins Air Force Base on March 9, 2006. Participants included: Brent Rabon and Mary Brown, Georgia EPD, Phillip Manning and Fred Otto, RAFB, and myself. Our findings were:

1. The OU-1 cap and vegetation cover were in good condition.
2. The surrounding fence, gate, and signage were in good condition.
3. The drainage modifications were in good condition and operating successfully.
4. The OU-3 groundwater extraction system and treatment plant were operating successfully.

Please thank your staff for their time and consideration in facilitating the inspection. If you have any questions regarding this matter, please contact me at: (404) 562 8552 or spariosu.dann@epa.gov.

Sincerely,

Dann Spariosu

Dann Spariosu, Ph.D.
Remedial Project Manager.

cc: Brent Rabon, GA EPD
Mary Brown, GA EPD
Phillip Manning, RAFB
Fred Otto, RAFB